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WAR MACHINE

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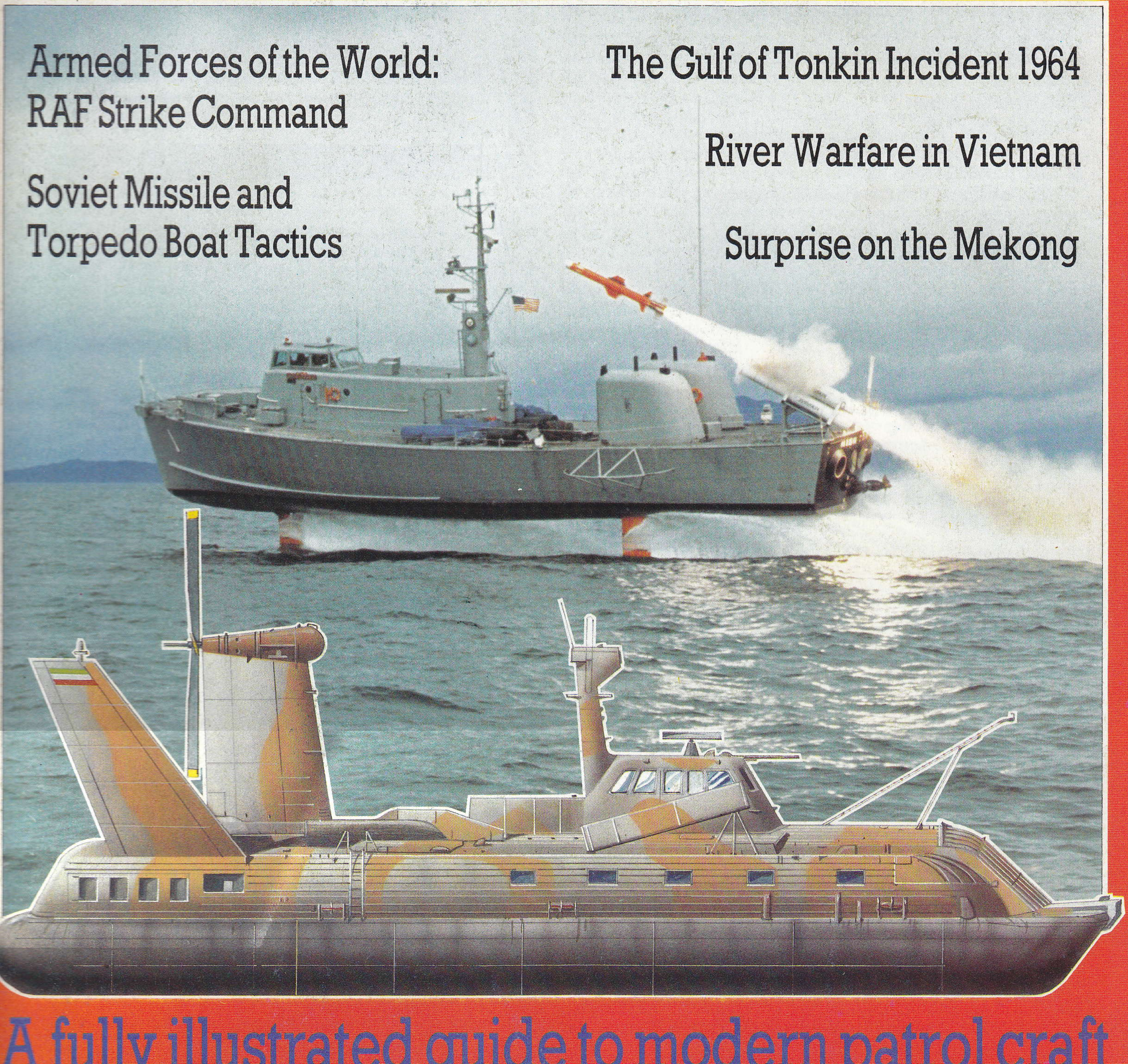

Armed Forces of the World: RAF Strike Command

Soviet Missile and Torpedo Boat Tactics

The Gulf of Tonkin Incident 1964

River Warfare in Vietnam

Surprise on the Mekong

A fully illustrated guide to modern patrol craft

WAR MACHINE

Volume 1 Issue 12

CONTENTS

Modern Patrol Craft

'Spica' class fast attack craft 222
'Huchuan' and 'Shanghai' class fast attack craft 222
The Gulf of Tonkin Incident 1964 223
'Pegasus' class patrol combatant hydrofoil (missile) 224
'Asheville' class patrol combatant 226
'PCF', 'PBR' and 'PB' series patrol craft 226
Riverine warfare classes 227
River Warfare in Vietnam 228
Surprise on the Mekong 232
South American river warfare craft 234
'Sparviero' class fast attack hydrofoil 235
'Combattante II' and 'Combattante III' class fast attack craft 235
'Ramadan' class fast attack craft 236
'Saar', 'Reshef' and 'Alia' class fast attack craft (missile) 236
'Komar', 'Osa' and 'Matka' class fast attack craft 237
'P4', 'P6', 'Shershen', 'Mol' and 'Turya' class fast attack craft 238
Soviet Missile and Torpedo Boat Tactics 239
'Stenka', 'Zhuk' and 'Schmel' class patrol craft 240

Armed Forces of the World

RAF Strike Command (Part 1) iii

Picture acknowledgements

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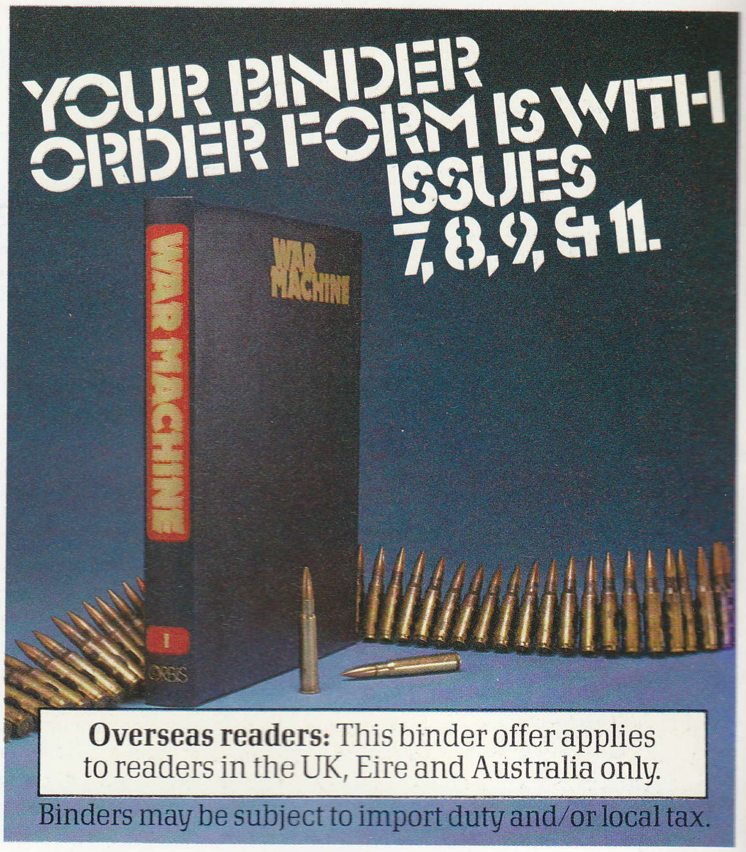

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Modern Patrol Craft

Fast, versatile and highly manoeuvrable, the patrol craft has now re-established itself as a potent asset in navies large and small. Equipped with the latest in a wide array of weaponry and technology, these small craft can very easily cause havoc against ships many times their size.

One of the forerunners of the US Navy's 'Pegasus' class of hydrofoils, the experimental vessel USS Tucumcari makes a high speed run in the English Channel off Plymouth.

For many years after World War II the torpedo attack craft remained the major threat in coastal forces. Armed with increasingly longer-ranged torpedoes as their primary anti-ship weapons and with heavy automatic guns, and powered by reliable diesel engines giving maximum speeds in excess of 45 kts at full power, the torpedo craft saw relatively little use in combat.

However, in the late 1950s the Soviet Union envisaged the capabilities of such craft increasing to a much greater extent if they were equipped with the then brand-new surface-to-surface anti-ship missile. The first such Soviet craft, the 'Komar' class, was a conversion of the 'P6' class motor torpedo boat. Unproven in combat until 1967, the missile-armed attack craft was neglected by most of the Western powers. Once the Egyptians sank the Israeli destroyer *Eilat*, however, this situation changed rapidly, and most NATO powers procured various types of such craft or converted torpedo boats or motor gunboats. The notable exception is the United Kingdom, which has consistently ignored the procurement of such vessels. Non-aligned and smaller nations saw the missile boat as the equalizer between themselves and the threat of the larger powers' navies, a missile boat carrying two or more missiles being capable of engaging and sinking much larger vessels such as a destroyer, this being conclusively proved in the 1971 Indo-Pakistan War, when a force of Indian 'Osa' class missile craft attacked the harbour at Karachi, sinking or damaging a number of Pakistani naval ships and foreign merchant ships, including the destroyer *Khaibar*, with SS-N-2A 'Styx' missiles. Surprisingly enough, battle involving missile boats on both sides did not arise until the 1973 'Yom Kippur' War between the Arabs and Israelis, the latter proving that the well-equipped missile craft is a deadly weapon when handled by a well-trained crew. The next major test did not arise until the current Gulf War broke out between the Iranians and the Iraqis. Used by both sides, the missile craft has not proved as effective as in 1973 as both countries lack the expertise and tactical know-how required to use it properly. In recent years the surface-to-surface missile has been mated with hydrofoil designs, although this has not proved a total success except with the Soviets. The Israeli have been particularly disappointed with their craft.

In the case of the riverine warfare craft, the French in Indo-China built up the first effective river combat force in the 1950s during their war there. When the Americans entered the ground war in the mid-1960s they had to relearn the lessons and ended up building their own riverine force, using modified LCM6 designs and specially-built craft. These proved themselves in combat and most were turned over to the South Vietnamese in the late 1960s and early 1970s as the Americans gradually withdrew their forces. The early 1900s concept of the river gunboat and monitor still lives in the areas of the world where big rivers are found; the oldest examples of river warfare craft still afloat are still plying the great rivers of South America.

A US riverine monitor leads a group of Armoured Troop Carriers (ATCs) during an anti-guerrilla operation on one of the many navigable rivers in South Vietnam. Sometimes those rivers and canals provided the only ground-level axis to Viet Cong strongpoints in the Mekong delta.

M-91-2
M-91-2
T-91-3

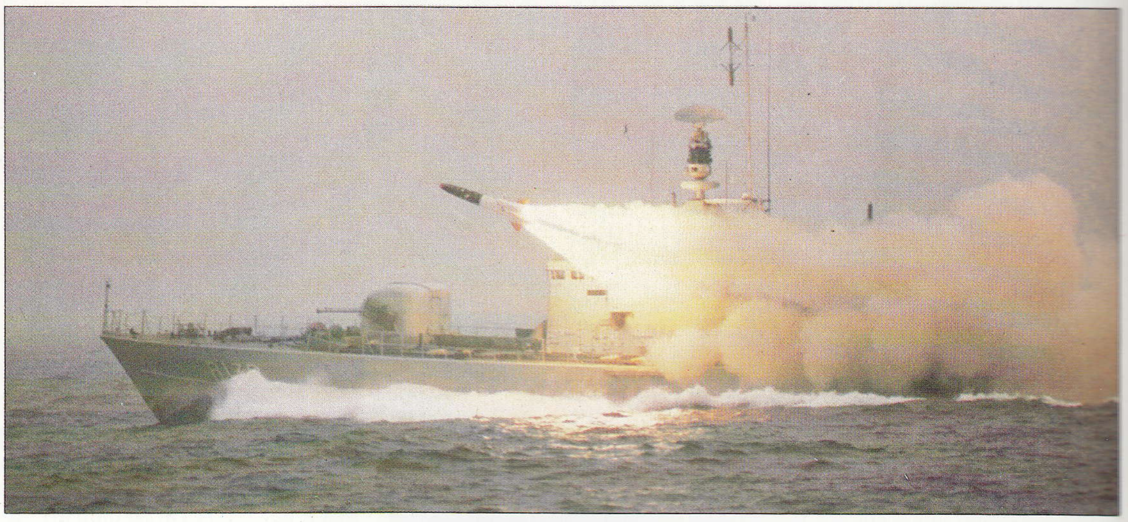
SWEDEN

'Spica' class fast attack craft (torpedo and missile)

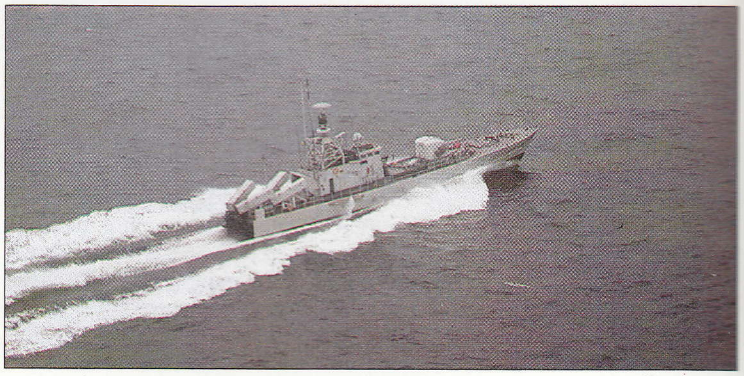
Because of Sweden's close proximity to the Soviet Union and that nation's extensive Baltic Fleet, which includes large numbers of small combatants, the Swedish navy has gradually paid off most of its large surface combatants and replaced them by a surface fleet of fast torpedo and missile attack craft, the largest component of which is and will continue to be provided by the **'Spica I' class, 'Spica II' class** and **'Spica III' class.** The six 'Spica Is' were commissioned between 1966 and 1968, and are currently armed with a single 57-mm dual-purpose Bofors gun and six 533-mm (21-in) torpedo tubes for the High-Test Peroxide-powered Tp61 anti-ship wire-guided torpedo. By 1985 two to four of the tubes will be replaced by four to eight Bofors RBS15 SSMs. On each side of the bridge are rails for a total of four 103-mm and six 57-mm rocket flare launchers. If necessary the torpedo tubes and missile launcher-containers can be replaced by mines. For fire-control purposes the 'Spica Is' have an M22 system with co-mounted radars in a single radome.

Between 1973 and 1976 a further 12 vessels were commissioned to the improved 'Spica II' design. These have an armament similar to the 'Spica I' but carry only eight 57-mm flare-launcher rails on each side of the forward gun turret. Their armament will also be modified in the same way as that of the 'Spica I' but with the addition of an LM Ericsson Giraffe low-level air-search radar. They have the earlier PEAB 9LV200 Mk 1 analog version of the digital fire-control system that is fitted to the latter 'Hugin' class. Both the classes have to have the two foremost torpedo tubes swung out through several degrees before they can be fired.

In 1981, as a direct response to the latest build-up of the Soviet Baltic Fleet, the Swedish navy ordered from Karlskrona Varvet, the main builder of the 'Spicas', two vessels of the 'Spica III' or **'Stockholm' class**. These 320-ton full load craft will act as flotilla leaders for the fast attack units, with the first due to commission in 1984. The 58-m (190-ft) long design has a maximum speed of over 30 kts and will be armed with a single 57-mm dual-purpose gun forward, a single 40-mm AA gun aft, two 533-mm (21-in) tubes for the Tp61 torpedo, and eight RBS15 SSMs. In addition they will carry an ASW outfit comprising variable-depth sonar, Tp42 400-mm (15.75-in) ASW torpedoes and depth charges. Mine rails will also be fitted. The same fire-control system as fitted to the 'Hugin' class, an EWS905 passive ECM suite and an Ericsson Giraffe radar will be the electronics fit carried.



Above: The 'Spica' classes form the backbone of the Swedish navy's fast attack craft forces. They are designed as multi-role vessels with the capability of switching armament fits to suit the assigned mission.



Right: A 'Spica II' class vessel carries four container-launcher boxes for the new Bofors RBS-15 surface-to-surface anti-ship missile. The 'Spica II' class are all due to convert to RBS-15 carriers by the end of 1984.

Specification
'Spica I' class
Names: *Spica, Sirius, Capella, Castor, Vega* and *Virgo*
Displacement: 215 tons full load
Dimensions: length 42.7 m (140.1 ft); beam 7.1 m (23.3 ft); draught 2.6 m (8.5 ft)
Propulsion: three Rolls-Royce Proteus gas turbines delivering 12,720 hp (9490 kW) to three shafts
Maximum speed: 40 kts
Complement: 28
Armament: see text
Electronics: one Scanter 009 search radar and one HSA M22 fire-control system

Specification
'Spica II' class
Names: *Norrköping, Nynäshamn, Norrtälje, Varberg, Västerås, Västervik, Umeå, Piteå, Luleå, Halmstad, Strömstad* and *Ystad*
Displacement: 215 tons full load
Dimensions: length 43.6 m (143 ft); beam 7.1 m (23.3 ft); draught 2.4 m (7.4 ft)
Propulsion: three Rolls-Royce Proteus gas turbines delivering 12,900 hp (9623 kW) to three shafts
Maximum speed: 40.5 kts
Armament: see text
Electronics: one Scanter 009 search radar and one PEAB 9LV200 Mk 1 fire-control system

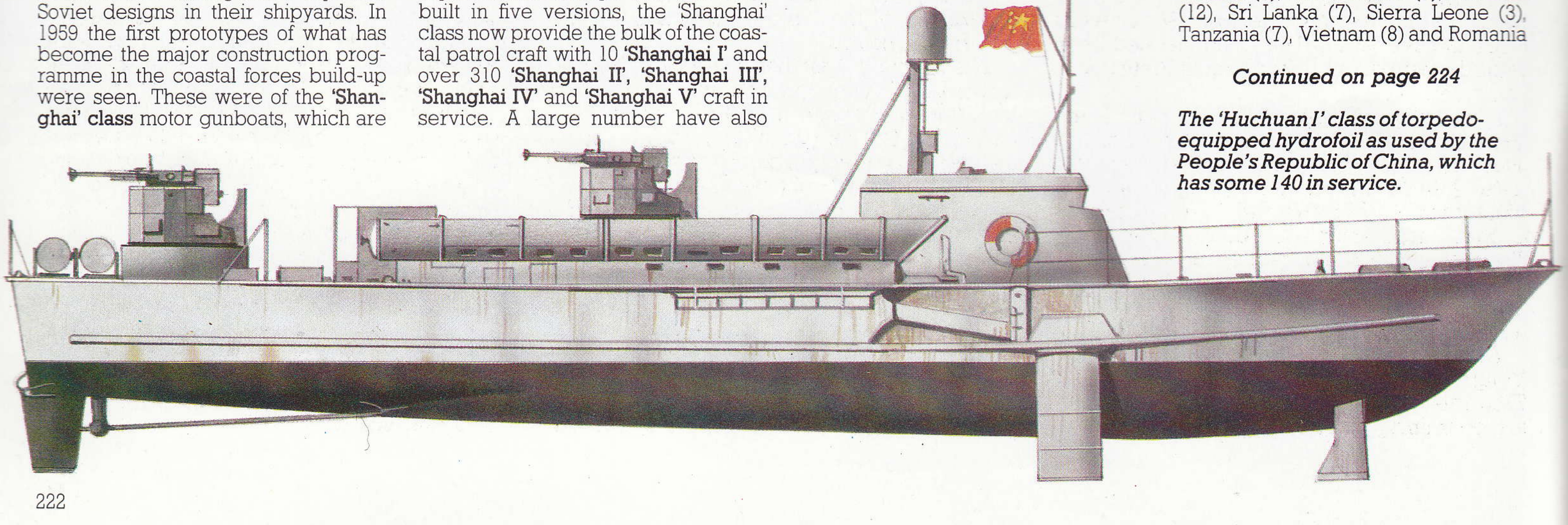
---

CHINA

'Huchuan' and 'Shanghai' class fast attack craft (gun and torpedo)

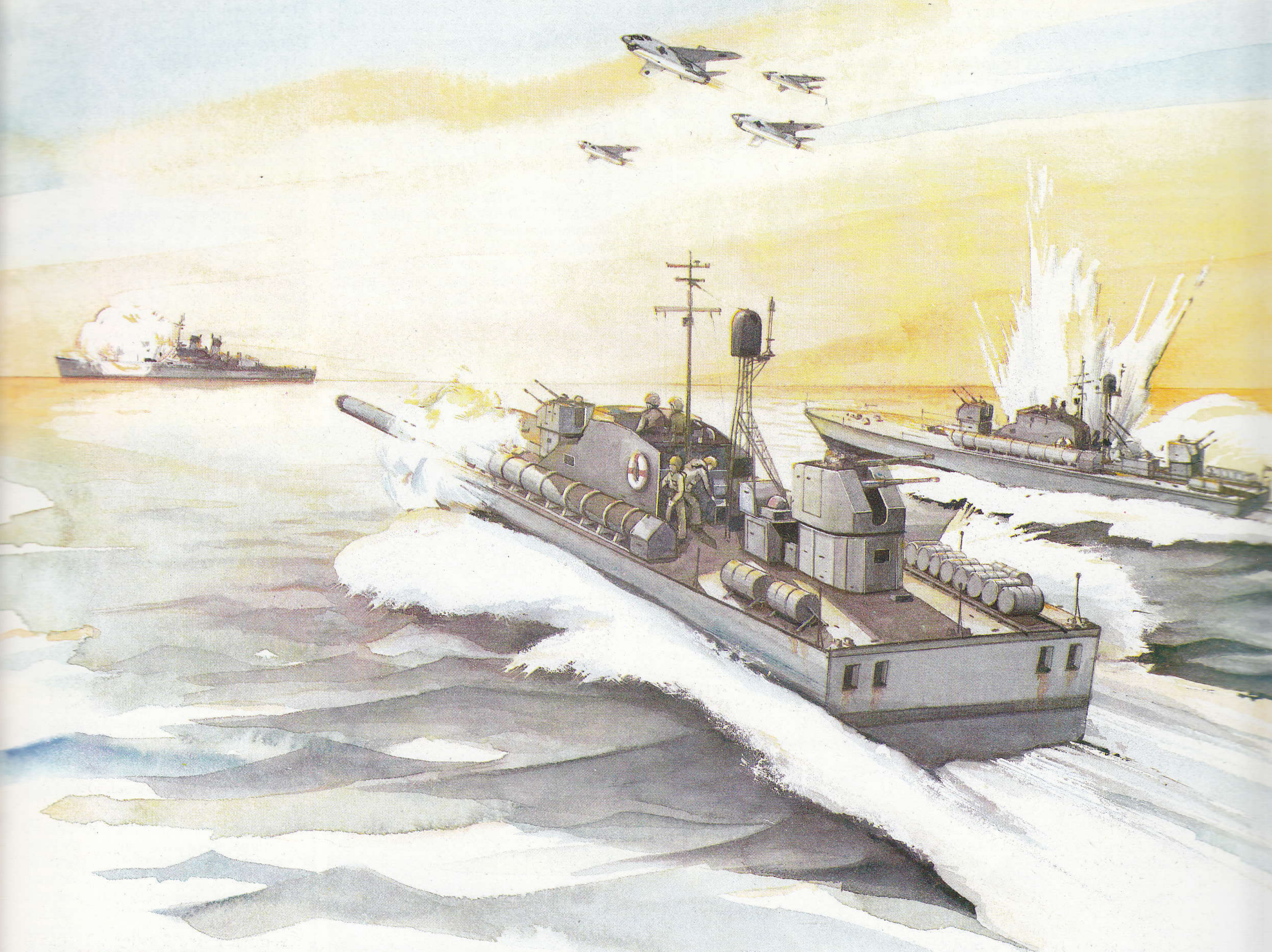
For many years the Chinese navy relied on vessels given to it by the Soviet Union or on building basic copies of Soviet designs in their shipyards. In 1959 the first prototypes of what has become the major construction programme in the coastal forces build-up were seen. These were of the **'Shanghai' class** motor gunboats, which are still constructed at the rate of 10 per year in several yards. A relatively unsophisticated design that has been built in five versions, the 'Shanghai' class now provide the bulk of the coastal patrol craft with 10 **'Shanghai I'** and over 310 **'Shanghai II', 'Shanghai III', 'Shanghai IV'** and **'Shanghai V'** craft in service. A large number have also been exported to Albania (6), Bangladesh (8), Cameroun (2), Congo (3), Guinea (6), North Korea (8), Pakistan (12), Sri Lanka (7), Sierra Leone (3), Tanzania (7), Vietnam (8) and Romania

Continued on page 224



The 'Huchuan I' class of torpedo-equipped hydrofoil as used by the People's Republic of China, which has some 140 in service.

The Gulf of Tonkin Incident 1964



By early 1964 American warships of the Pacific-based 7th Fleet were deployed off the Indo-China coast in the Gulf of Tonkin on a routine basis to collect signal intelligence, launch reconnaissance aircraft and covertly support anti-Communist forces in attacking Communist territory. In the middle of the afternoon of 2 August the destroyer USS *Maddox* detected three unidentified high speed craft on her radar whilst she was passing Hon Me island, 50 km (32 miles) south of the North Vietnamese torpedo boat base at Loc Chao that had been raided the previous night by South Vietnamese commandoes.

Identifying the approaching craft as North Vietnamese MTBs, the *Maddox* fired warning shots from her 127-mm (5in) main armament to deter them. The warning failed and at a range of nearly 5000 m (5,470 yards) two of the craft each released a single torpedo at the *Maddox*. These the *Maddox* evaded by manoeuvring at speed whilst engaging the craft with direct fire from her gun batteries, appearing to hit the third boat.

As the battle progressed a flight of four Vought F-8E Crusaders from the carrier USS *Ticonderoga*, launched previously on an armed training mission, were vectored into the area to assist the *Maddox*. The destroyer division commander embarked on the vessel ordered the Crusaders to attack the torpedo boats as they withdrew northwards. Using their four 20-mm cannon and 127-mm (5-in) Zuni unguided rockets the aircraft made several strafing and rocket attacks on the craft, sinking the previously damaged unit. The total time of the engagement from the initial contact on *Maddox*'s radar to the destroyer retiring after the sinking of the torpedo boat was approximately 3½ hours.

The *Maddox* was then joined by the destroyer USS *Turner Joy*. The carrier USS *Constellation* was routed from Hong Kong to the Gulf, some 650 km (400 miles) away, whilst in the meantime daylight combat air patrols over the destroyers' patrol area was initiated from the USS *Ticonderoga*. At night the destroyers retired to an area about 160 km (100 miles) off the coast to reduce the chance of a sneak attack in the dark. However, on the night of 4 August the *Maddox* again picked up on her radar high-speed contacts closing the destroyers fast. These were identified as five North Vietnamese torpedo craft and a short ineffectual gun battle ensued in poor weather. The torpedo boats also fired several torpedoes that narrowly missed the destroyers as they manouevred in the darkness. The *Ticonderoga* launched two Douglas A-1 Skyraiders for close air support, but by midnight the targets had retired from the combat zone.

Following this second attack in international waters President Johnson ordered a series of simultaneous retaliatory air strikes from the carriers *Constellation* and *Ticonderoga* on four North Vietnamese coastal force bases from Quang Khe, 80 km (50 miles) north of the Demilitarized Zone between North and South Vietnam, to the large base at Hon Gai in the north. Flights of F-8s, A-1s and Douglas A-4 Skyhawks bombed and rocketed the targets, damaging all the bases' support facilities and sinking or damaging some 25 torpedo boats and motor gunboats. This represented over 50 per cent of the total North Vietnamese inventory of these craft at the time. It was during these strikes that the first American PoW was captured in North Vietnam, when an A-4 from the *Constellation* was shot down by AA gunfire over Hon Gai. The two incidents in the gulf were the first overt attacks by the North Vietnamese that were ultimately to end in the commitment of US ground, air and naval forces to the Indo-China war.

(20+ built locally in three variants). The last is particularly intriguing as Romania is a member of the Soviet Warsaw Pact alliance.

Around 1966 the first of an indigenously designed and built hydrofoil torpedo attack craft was seen. Constructed by the Hudung shipyard in Shanghai, this **'Huchuan' class** has subsequently been identified in two versions. The first, the **'Huchuan I'**, has a twin 14.5-mm (0.51-in) heavy machine-gun mounting amidships with a second twin mounting aft of it, whilst the bridge is placed forward of the torpedo tube mouths. The second, the **'Huchuan II'**, has the bridge placed farther aft, in line with the tubes, and the amidships mounting moved to the forecastle. The hull is of all-metal construction and the forward pair of foils can be withdrawn into recesses in the hull when the craft is hullborne. At present there are some 140 in service with China and the class has been exported to Albania (32), Pakistan (4), Tanzania (4) and Romania (3 plus 17+ as part of the local construction programme). The torpedoes carried are Chinese-built copies of Soviet 533-mm (21-in) anti-ship designs.

Specification
'Huchuan' class
Displacement: 39 tons full load
Dimensions: length 21.8 m (71.5 ft); beam 4.9 m (16.1 ft) or 7.5 m (24.6 ft) when foilborne; draught 1.0 m (3.3 ft) or 0.31 m (1.0 ft) when foilborne
Propulsion: three M50 diesels delivering 3,600 hp (2685 kW) to three shafts
Maximum speed: 54 kts
Complement: 12-15
Armament: two 533-mm (21-in) anti-ship torpedo tubes and two twin 12.7-mm (0.5-in) heavy machine-guns
Electronics: one 'Skin Head' radar

Specification
'Shanghai I' class
Displacement: 100 tons full load
Dimensions: length 35.1 m (115 ft); beam 5.5 m (18 ft); draught 1.7 m (5.5 ft)
Propulsion: four diesels delivering 4,220 hp (3148 kW) to four shafts
Maximum speed: 28 kts
Complement: 25
Armament: one twin 57-mm AA and one twin 37-mm guns, eight depth charges and up to 10 mines
Electronics: one 'Skin Head' radar and one hull-mounted sonar

Specification
'Shanghai II, III, IV and V' classes
Displacement: 155 tons full load
Dimensions: length 38.8 m (127.3 ft); beam 5.4 m (17.7 ft); draught 1.5 m (4.9 ft)
Propulsion: four diesels delivering 4,800 hp (3580 kW) to four shafts
Maximum speed: 30 kts
Complement: 38
Armament: (Type II) two twin 37-mm AA and two twin 25-mm AA guns; (Types III and IV) one twin 57-mm AA and one twin 25-mm AA guns; some boats carry a twin 75-mm recoilless rifle mounting in the bows, and all types carry eight depth charges and have provision for up to 10 mines
Electronics: one 'Pot Head' or 'Skin Head' radar and provision for hull-mounted sonar

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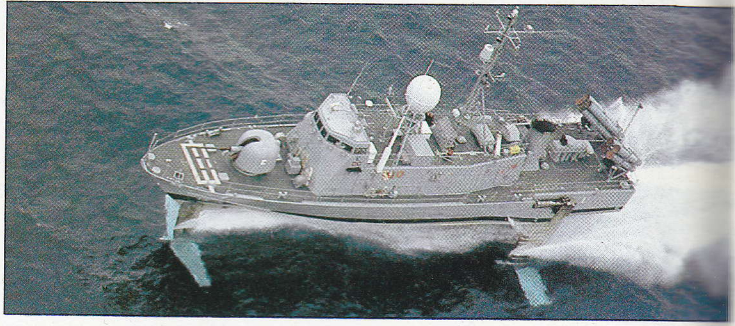
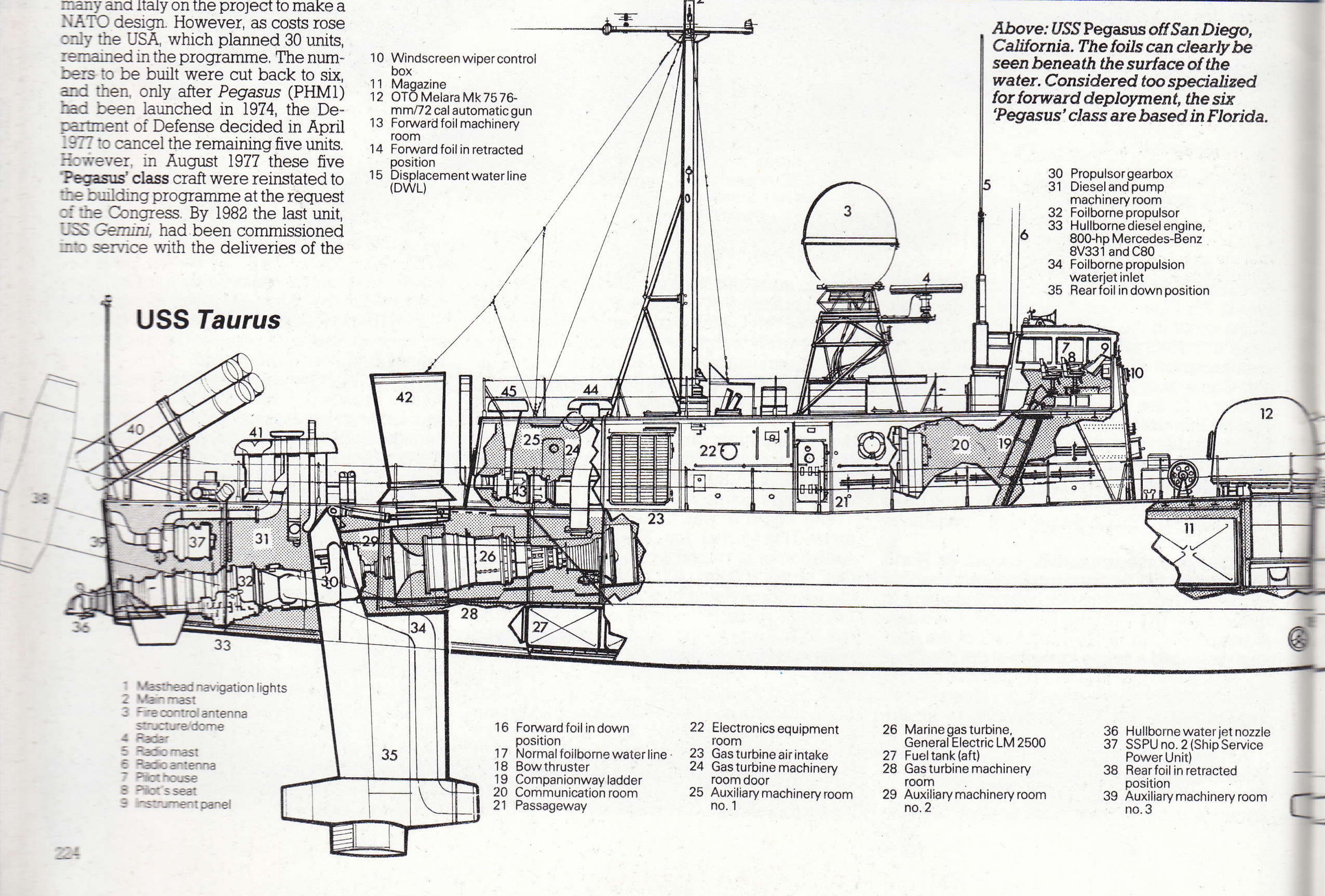
USA

'Pegasus' class patrol combatant hydrofoil (missile)

Hydrofoils were the only exception to the United States Navy's lack of interest in fast attack craft during the 1950s. The first such unit launched was the USS *High Point,* in 1962, for ASW Trials work. Interest then shifted to fast gunboats during the mid-1960s, when the USS *Flagstaff* and USS *Tucumcari* were tested. The final shift was when it was decided to develop a missile-armed patrol hydrofoil (PHM) successor to the missile-armed 'Asheville' class patrol gunboat variant that had been used in the Mediterranean. The US Navy combined with West Germany and Italy on the project to make a NATO design. However, as costs rose only the USA, which planned 30 units, remained in the programme. The numbers to be built were cut back to six, and then, only after *Pegasus* (PHM1) had been launched in 1974, the Department of Defense decided in April 1977 to cancel the remaining five units. However, in August 1977 these five **'Pegasus' class** craft were reinstated to the building programme at the request of the Congress. By 1982 the last unit, USS *Gemini,* had been commissioned into service with the deliveries of the craft from the builders (the Boeing Company in Seattle) running seven months late and 26 per cent over cost estimates. All six craft will form a unit to be based at Key West, Florida, for tests and the evaluation of systems and tactics, and for surveillance duties in the Caribbean area. As the US Navy believes that the class requires too specialized a logistic support network for forward deployment to the Mediterranean and similar front line areas, the craft will only have a limited role within the fleet. No further missile or gunboat classes are planned at present.



Above: USS Pegasus *off San Diego, California. The foils can clearly be seen beneath the surface of the water. Considered too specialized for forward deployment, the six 'Pegasus' class are based in Florida.*



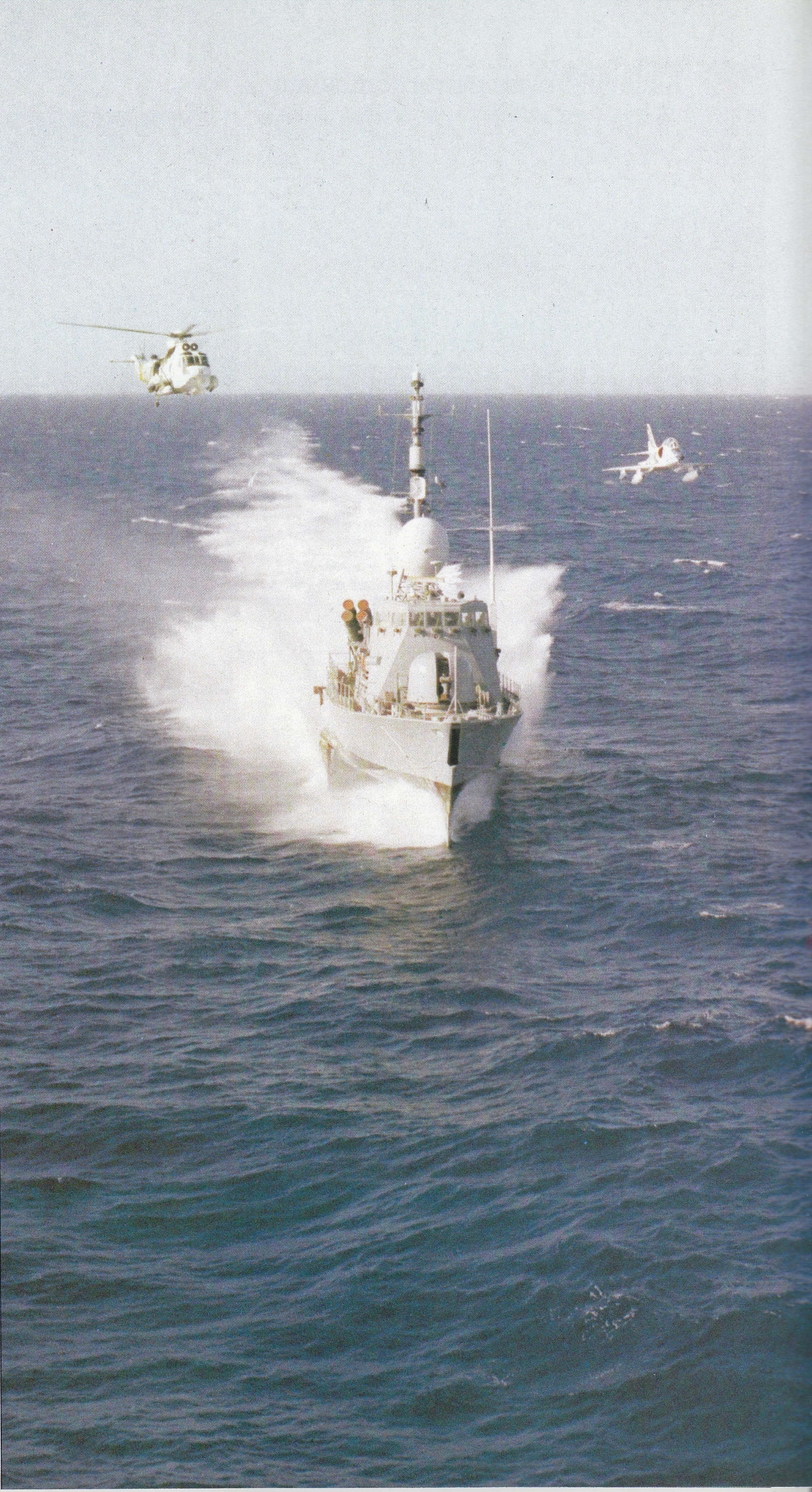
USS *Taurus*

1 Masthead navigation lights
2 Main mast
3 Fire control antenna structure/dome
4 Radar
5 Radio mast
6 Radio antenna
7 Pilot house
8 Pilot's seat
9 Instrument panel
10 Windscreen wiper control box
11 Magazine
12 OTO Melara Mk 75 76-mm/72 cal automatic gun
13 Forward foil machinery room
14 Forward foil in retracted position
15 Displacement water line (DWL)
16 Forward foil in down position
17 Normal foilborne water line
18 Bow thruster
19 Companionway ladder
20 Communication room
21 Passageway
22 Electronics equipment room
23 Gas turbine air intake
24 Gas turbine machinery room door
25 Auxiliary machinery room no. 1
26 Marine gas turbine, General Electric LM 2500
27 Fuel tank (aft)
28 Gas turbine machinery room
29 Auxiliary machinery room no. 2
30 Propulsor gearbox
31 Diesel and pump machinery room
32 Foilborne propulsor
33 Hullborne diesel engine, 800-hp Mercedes-Benz 8V331 and C80
34 Foilborne propulsion waterjet inlet
35 Rear foil in down position
36 Hullborne water jet nozzle
37 SSPU no. 2 (Ship Service Power Unit)
38 Rear foil in retracted position
39 Auxiliary machinery room no. 3

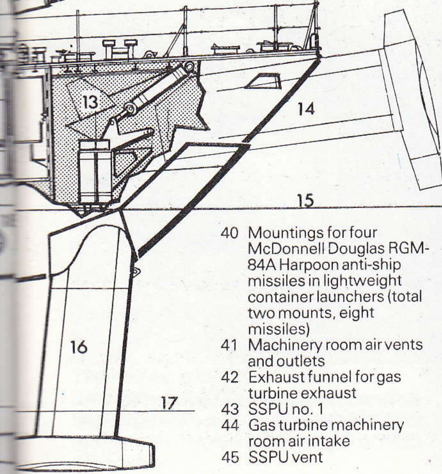
The *Pegasus* itself is fitted with the Mk 94 fire-control system, which is the US designation for the Hollandse Signaalapparaten WM28 system; the remaining five craft are fitted with the Mk 92 Model 1 system, which is a modified WM28 built by the Sperry Company of the USA. The single 76-mm (3-in) Mk 75 licence-built OTO-Melara automatic gun carried has a total of 330 rounds in its ready-use magazine and main below-deck magazine. There is also additional space abaft the mast for mounting two single 20-mm Mk 20 AA guns if required. However, the main armament is a pair of quadruple Harpoon SSM container-launcher canister groupings fitted on the stern. The Harpoon is a 695.5-kg (1,533-lb), 110-km (68-mile) range active-radar terminal homing missile of the 'fire and forget' type.

Specification

Names: *Pegasus, Hercules, Taurus, Aquila, Aires* and *Gemini*
Displacement: 240 tons full load
Dimensions: hull length 44.3 m (145.3 ft), beam 8.6 m (28.2 ft) and draught 2.3 m (7.5 ft); foilborne length 40.5 m (132.9 ft) and beam 14.5 m (47.5 ft)
Propulsion: foilborne one General Electric gas turbine delivering 18,000 shp (13428 kW) to two waterjets, and hullborne two MTU diesels delivering 3,200 hp (2387 kW) to two waterjets
Maximum speed: 11 kts hullborne and 48 kts foilborne
Complement: 22
Armament: one 76-mm (3-in) Mk 75 dual-purpose gun and eight Harpoon SSMs in two quadruple launchers
Electronics: one SPS-63 search radar, one Mk 92 fire-control system (Mk 94 in *Pegasus*), one SLR-20 ECM system and two Mk 35 SRBoc Chaff launchers



Right: USS* Pegasus *in company with a USN VC-1 composite squadron Sikorsky SH-3G Sea King helicopter and McDonnell Douglas TA-4J Skyhawk two-seat operational attack trainer jet off Hawaii. It is envisaged that the 'Pegasus' class will have only a limited role within the US Fleet.



40 Mountings for four McDonnell Douglas RGM-84A Harpoon anti-ship missiles in lightweight container launchers (total two mounts, eight missiles)
41 Machinery room air vents and outlets
42 Exhaust funnel for gas turbine exhaust
43 SSPU no. 1
44 Gas turbine machinery room air intake
45 SSPU vent

USA

'Asheville' class patrol combatant

Seventeen *'Asheville' class* patrol gunboats were built by Tacoma Boatbuilding and Peterson Builders in the period between 1966 and 1971 out of a planned 22 for coastal patrol and blockade duties, the gas-turbine craft having been developed in the Kennedy era as a response to the Cuban crisis of the early 1960s. Subsequently craft were used extensively in the riverine warfare operations conducted in Vietnam and, in the mid-1970s, four were modified to carry Standard anti-radiation homing SSM to act as anti-tattletale escorts against Soviet warships in the Mediterranean. The hulls are of aluminium, and with superstructures of aluminium and fibreglass construction. Currently only two of the 'Ashevilles' remain in the US Navy at Norfolk, Virginia, to train Saudi Arabian naval personnel. The remaining vessels have either been transferred (two in a disarmed state to the US Government Environmental Protection Agency, one to South Korea, two to Turkey, two to Taiwan, three to US Navy research and development centres and two to Colombia) or placed in storage awaiting transfer. Eventually all 17 will be transferred.

One major task that the vessels undertook as training units in the US Navy for several years was the simulation of Soviet small missile craft during US and NATO naval exercises. Although considered to be reasonably good seaboats (they can ride out very severe storms), the craft have also acquired a bad reputation for discomfort in seaways. They also have a cavitation problem associated with the type of propeller used, which prevents them achieving their maximum design speed of over 40 kts. Two of the units, USS *Antelope* and USS *Ready,* tested the Dutch-designed Mk 87 fire-control system, a near relative to the Mk 92 used on the later PHM and FFG classes, in place of their standard-fit Mk 63 system.

A multi-mission variant of the 'Asheville' class produced by Tacoma Boatbuilding is the **PSMM 5' class**, which is operated by the Philippines (three South Korean-built craft), South Korea (four plus four locally-built craft) and Taiwan (one plus three locally-built craft).

Specification
'Asheville' class

Displacement: 245 tons full load

Dimensions: length 50.1 m (164.5 ft); beam 7.3 m (23.8 ft); draught 2.9 m (9.5 ft)

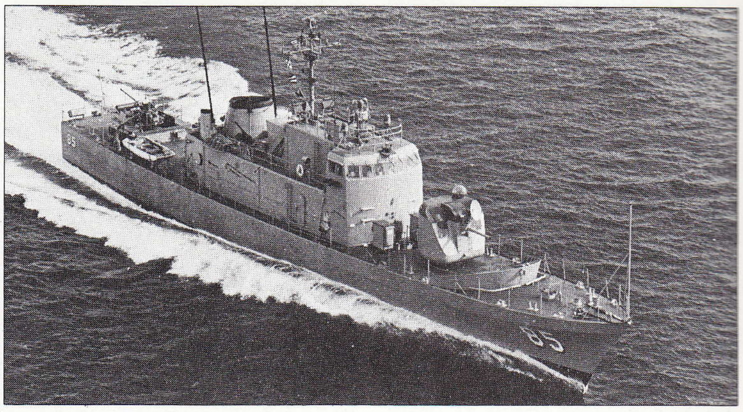
Propulsion: CODOG (COmbined Diesel Or Gas turbine) two Cummins diesels delivering 3,500 hp (2611 kW) or one General Electric gas turbine delivering 13,300 shp (9922 kW) to two shafts

Maximum speed: 38 kts

Complement: 28

Armament: one 76-mm (3-in) Mk 34 AA guns, one 40-mm Mk 3 AA gun and twin 12.7-mm (0.5-in) heavy machine-guns

Electronics: one Raytheon Pathfinder navigation radar, one SPG-50 fire-control radar and one Mk 63 fire-control system



Although 17 'Asheville' class patrol gunboats were built, only four remain in US Naval Reserve service. These are scheduled for transfer to other nations in the near future. Many of the class served off the coast of Vietnam, including USS Gallup, *seen here in June 1967.*

USA

'PCF', 'PBR' and 'PB' series patrol craft

The two principal coastal warfare craft used by the Americans in the Vietnam War were the **PCF** (or **'Swift' class**) and the **PBR** (or **Plastic**) type. The Patrol Craft, Fast design was adopted from that of a standard commercial work boat used for oil rig support work in the Gulf of Mexico. The 200 or so PCFs were all constructed by Sewart Seacraft of Berwick, Louisiana in 1965-6. The first 104 were of the **PCF Mk I** design, whilst the remainder (with less sheer, the pilot house located farther aft and a broken deck line) were built to the improved **PCF Mk II** design. Currently three Mk I and two Mk II craft remain in service with the US Navy. A total of 104 was transferred to South Vietnam in 1968-70, 12 to the Philippines in 1966, nine to Cambodia in 1972-3 and seven to Zaire. Additional units were constructed for the Philippines (14), South Korea and Thailand (12). Others were lost during the Vietnam War.

The Patrol Boat, River, of which some 500 were constructed in **PBR Mk I** and **PBR Mk II** variants between 1966 and 1973, is smaller than the PCF, with a fibreglass-reinforced plastic hull, ceramic armour and an open-topped conning bridge. Propulsion and steering are by means of a waterjet system. For work in the narrow and shallow inland waterways of Vietnam the boats were designed with a draught of less than 1 m (3.3 ft). Some 160 PBR Mk Is were constructed, the rest being PBR Mk IIs. Only 22 of the latter remain in service with the US Naval Reserve for training purposes. Most (293) of the remainder were transferred to South Vietnam, with others going to Cambodia (25), Thailand (37) and Israel (28, the majority of which were built locally).

The Patrol Boat was conceived of as the successor to the PCF. The first two, of the **PB Mk I** variant, were built by Sewart Seacraft in 1972 for delivery in 1973. An alternative design, the **PB Mk III**, was then tested in competition with the PB Mk I to meet the US Navy requirement for a multi-mission inshore warfare craft. The PB Mk III won, and 17 were built by Paterson Shipbuilders of Sturgeon Bay, Wisconsin. Like the PCF, the PB was derived from a Gulf of Mexico oil rig work boat design. The wheel house is offset to starboard to allow maximum weapon space, and the boats can be rigged to carry a wide variety of armament including Penguin Mk 2 SSMs, mines, torpedoes or minesweeping equipment. The engines are quietened to allow the boats to be used in clandestine operations. The missing PB Mk II design was not built.

Specification
PCF Mk I

Displacement: 19 tons full load

Dimensions: length 15.3 m (50.2 ft); beam 4.0 m (13.1 ft); draught 1.1 m (3.6 ft)

Propulsion: two General Motors diesels delivering 850 hp (634 kW) to two shafts

Maximum speed: 28 kts

Complement: 6

Armament: two single 12.7-mm (0.5 in) heavy machine-guns and one combined 8 mm mortar and 12.7-mm (0.5 in) heavy machine-gun mounting

Electronics: one LN66 navigation radar

Specification
PCF Mk II

Displacement: 19.2 tons full load

Dimensions: length 15.6 m (51.2 ft); beam 4.1 m (13.5 ft); draught 1.1 m (3.6 ft)

Propulsion: two General Motors diesels delivering 850 hp (634 kW) to two shafts

Maximum speed: 28 kts

Complement: 6

Armament: as for PCF Mk I

Electronics: one LN66 navigation radar

Specification
PBR Mk I

Displacement: 6.5 tons full load

Dimensions: length 9.5 m (31.2 ft); beam 3.2 m (10.5 ft); draught 0.6 m (2 ft)

Propulsion: two General Motors diesels delivering 430 hp (321 kW) to two pumpjets

Maximum speed: 25 kts

Complement: 4-5

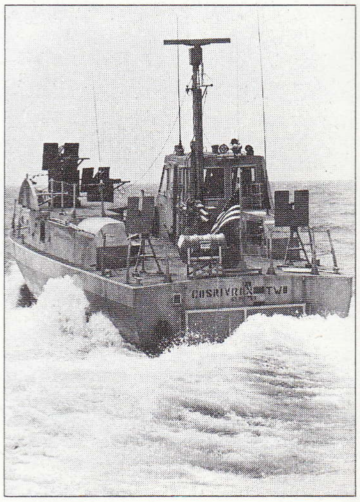
Armament: one twin 12.7-mm (0.5-in) heavy machine-gun, one 7.62-mm (0.3-in) medium machine-gun and one 40-mm grenade-launcher

Electronics: one Raytheon 1900 search radar

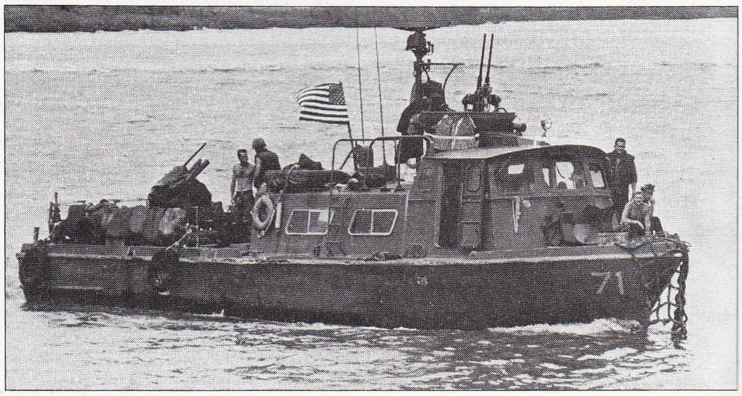
Specification
PBR Mk II

Displacement: 7.2 tons full load

Dimensions: length 9.7 m (31.8 ft);



Above: A PB Mk III patrol craft under way. Known as the 'Sea Spectre' class, this design was derived from a Gulf of Mexico oil rig work boat.



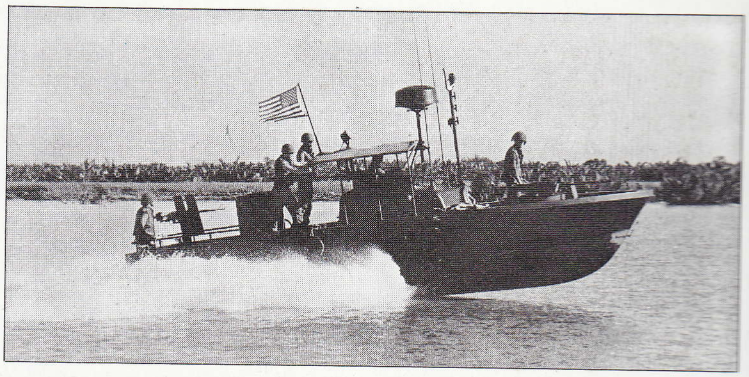
Seen during the Vietnam war, this PCF is returning to base after a mission with a US Navy Underwater Demolition Team embarked. The armament has been modified to include a twin 12.7-mm (0.5-in) heavy machine-gun mounting.

'PCF', 'PBR' and 'PB' series patrol craft (continued)

beam 3.6 m (11.8 ft); draught 0.8 m (2.6 ft)
Propulsion: two General Motors diesels delivering 430 hp (321 kW) to two pumpjets
Maximum speed: 25 kts
Complement: 4-5
Armament: as for PBR Mk I plus one 60-mm mortar in some boats
Electronics: one Raytheon 1900 search radar

Specification
PB Mk I
Displacement: 36.3 tons full load
Dimensions: length 19.8 m (65 ft); beam 4.9 m (16.1 ft); draught 1.5 m (4.9 ft)
Propulsion: two General Motors diesels delivering power to two shafts
Maximum speed: 26 kts
Complement: 5
Armament: one twin and four single 12.7-mm (0.5-in) heavy machine-guns or 20-mm cannon
Electronics: one LN66 navigation radar

Specification
PB Mk II
Displacement: 41.3 tons full load
Dimensions: length 19.8 m (65 ft); beam 5.5 m (18 ft); draught 1.8 m (5.9 ft)
Propulsion: three General Motors diesels delivering 950 hp (709 kW) to three shafts
Maximum speed: 26 kts
Complement: 5
Armament: four single 12.7-mm (0.5-in) heavy machine-guns
Electronics: one LN66 navigation radar



A PBR Mk II craft on a high-speed patrol in the Long Tau river, South Vietnam. The PBR was especially useful in patrolling the rivers and canals to prevent movement of enemy forces and supplies.

USA

Riverine warfare classes

For war in the Mekong Delta and other river systems in Vietnam, the US Navy and the US Army developed joint task forces. To outfit these the US Navy had to organize river assault squadrons with specially designed types of assault craft. These were mainly based on modifications of the 'LCM6' landing craft. The squadrons were deployed with complements of 52 **Armoured Troop Carrier (ATC)**, five **Command and Control Boat (CCB)**, 10 fire-support **Monitor (MON)** and two ATC refuelling craft. They also had 32 **Assault Support Patrol Boat (ASPB)** craft assigned, and these last were of the only type specifically built for riverine warfare.

Two versions of the ASPB were built in 1967-8. Both had welded steel hulls, aluminium superstructures and an engine silencing system fitted with underwater exhaust outlets. The boats were usually used as the leading units of assault forces, sweeping ahead with a chain drag to counter command-detonated river mines. They also acted as escorts, patrol craft and counter-ambush vessels. The ASPB hull was also converted to a riverine minesweeper variant, the **MSR** patrol minesweeper, and as a command and control craft. Armament was usually a single 20-mm gun in a forward turret, a twin 12.7-mm (0.5-in) heavy machine-gun (HMG) in an aft turret atop the conning position, two 7.62-mm (0.3-in) medium machine-guns (MMGs) in two further turrets just forward of the HMG turret, and two 40-mm fully automatic grenade-launchers. A dual 81-mm/12.7-mm (0.5-in) mortar/HMG mount was also carried on some boats in an open well aft. The alternate fit most frequently adopted was the replacement of the aft 12.7-mm guns by another single 20-mm gun.

The monitors were either converted 'LCM6' craft or specially constructed **MON Mk V** craft that differed primarily in having rounded bows instead of the landing craft bow door arrangement of the 'LCM6'. A typical armament of the conversions was a single 40-mm gun in an armoured turret forward, a single 20-mm gun in a small turret aft on top of the conning position, two single 12.7-mm (0.5-in) HMGs in similar turrets just forward of this to port and starboard, an 81-mm mortar or two army M10-8 flamethrower units in a well located between the control position and the forward turret, plus various small arms mounted along the craft's sides. The later MON Mk Vs had a twin 20-mm bow turret, an 81-mm mortar in the well, the two 12.7-mm (0.5-in) HMG turrets and four 7.62-mm (0.3-in) MMGs. A few of them had the forward turret and the mortar well replaced by an armoured turret containing an army M101 105-mm howitzer for direct-fire missions against riverside bunker complexes. Both types had screen and bar armour fitted to defend against hollow-charge rocket-projectile and recoilless-rifle fire.

The CCB was similar to the MON types except that the mortar well was covered over by a command and communications facility module. The armament was the bow turret with either a single 20-mm or 40-mm gun, the aft turret with a 12.7-mm (0.5-in) HMG and the two other turrets with 7.62-mm (0.3-in) MMGs. A 60-mm mortar was also carried by some craft. An alternative weapon fit was three single 20-mm guns in turrets, two single 7.62-mm (0.3-in) MMGs and two 40-mm automatic grenade-launchers. Both the MON and CCB could tow disabled craft via a towing rig located on their sterns.

The ATCs were converted 'LCM6' craft with bar armour on the hull and superstructure, bulletproof awnings over the troop and cargo deck and space for up to one platoon of 40 fully-equipped infantrymen. A few were also fitted with a helicopter pad in place of the awnings to act as battalion medical aid stations for casualty evacuation during operations. Others had a 4500-litre (990-Imp gal) diesel fuel tank fitted to the cargo deck so that they could act as refuelling craft. A **Combat Salvage Boat (CSB)** was also produced as an 'LCM6' conversion.

Precise numbers of the various riverine types built or converted have never been revealed, although it is known that at least nine CCBs, 84 ASPBs, 42 MON Mk Vs, 22 MON conversions, 100 ATCs and four CSBs were transferred to South Vietnam in the 1960s and early 1970s. The remainder were discarded, although unknown numbers were also lost in combat during the war.

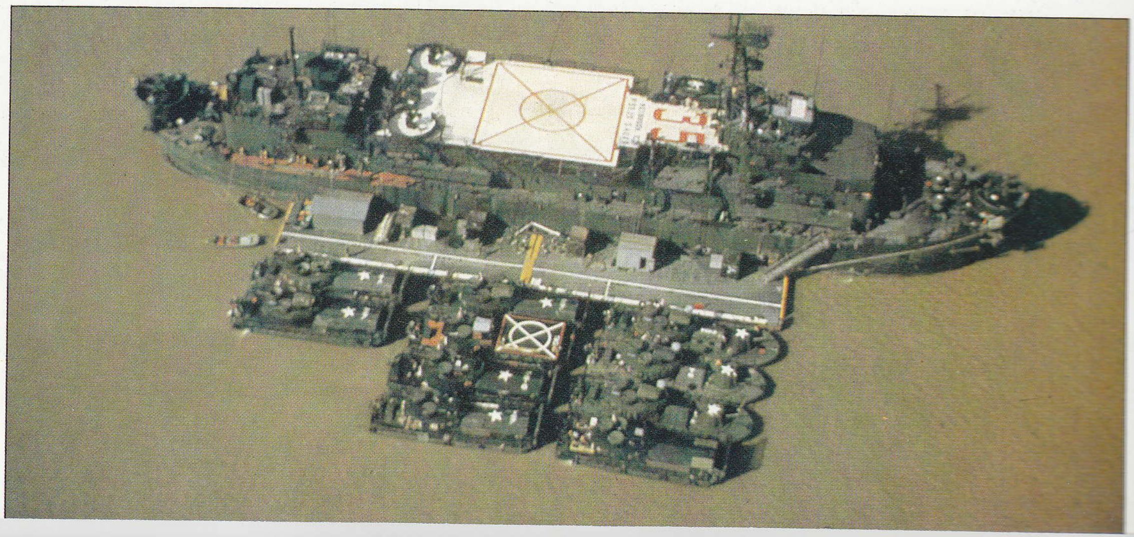
Specification
'CCB' class
Displacement: 75.5 tons full load
Dimensions: length 18.3 m (60 ft); beam 5.3 m (17.4 ft); draught 1.0 m (3.3 ft)
Propulsion: two diesels delivering 330 hp (246 kW) to two shafts
Maximum speed: 8.5 kts
Complement: 11
Armament: see text
Cargo: none

Specification
Monitor (converted type)
Displacement: 75 tons full load
Dimensions: length 18.3 m (60 ft); beam 5.2 m (17 ft); draught 1.0 m (3.3 ft)
Propulsion: two diesels delivering 330 hp (246 kW) to two shafts
Maximum speed: 8 kts
Complement: 10
Armament: see text
Cargo: none

Specification
Monitor Mk V type
Displacement: 75.5 tons full load
Dimensions: length 18.3 m (60 ft); beam 5.3 m (17.4 ft); draught 1.0 m (3.3 ft)
Propulsion: two diesels delivering 330 hp (246 kW) to two shafts
Maximum speed: 8.5 kts
Complement: 11
Armament: see text
Cargo: none

Specification
'ATC' class
Displacement: 70 tons full load
Dimensions: length 17.1 m (56.1 ft); beam 5.3 m (17.4 ft); draught 1.0 m (3.3 ft)
Propulsion: two diesels delivering 330 hp (246 kW) to two shafts
Maximum speed: 8.5 kts
Complement: 7
Armament: see text
Cargo: 40 fully-equipped troops

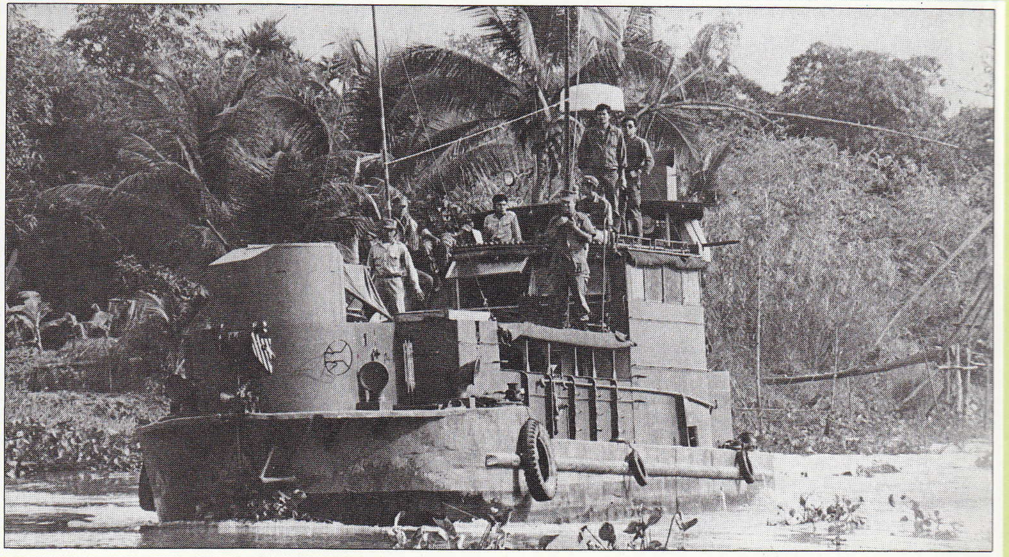
Specification
'ASPB' class
Displacement: 38 tons full load
Dimensions: length 15.3 m (50.2 ft); beam 5.3 m (17.4 ft); draught 1.2 m (3.9 ft)
Propulsion: two diesels delivering 880 hp (656 kW) to two shafts
Maximum speed: 14 kts
Complement: 5
Armament: see text
Cargo: none



The self-propelled auxiliary barracks ship USS Benewah *lie in the Soil Rap river, acting as mother ship to the riverine warfare assault craft alongside.*

River Warfare in Vietnam

The USA had decided to undertake comprehensive search-and-destroy operations against the omnipresent yet largely 'invisible' Viet Cong guerrillas. Nowhere was the enemy more elusive than in the vast swamps of the Mekong Delta. It required special equipment, special troops, and produced a special kind of warfare.



A legacy from the French involvement in Indo-China was a number of ex-French riverine warfare craft used by the South Vietnamese navy. Included in these vessels were several command boats as seen here.

American naval involvement in the Vietnam War started in August 1964, when North Vietnamese attack craft were engaged by the destroyer USS *Maddox*, but it was another year before riverine and coastal operations began in earnest.

The purpose of inshore operations was to stop the flow of food, ammunition and reinforcements to the Viet Cong, for in much of Vietnam the rivers are the only highways; large areas of the Mekong Delta, for example, are impassable to road traffic. On 1 August 1965 the coastal surveillance Operation 'Market Time' was made the responsibility of Task Force 115 under Rear Admiral Norvell G. Ward. Admiral Ward's task was made easier by the provision of craft much better suited to the mission than the 7th Fleet's destroyers and frigates. The Coast Guard's Squadron One, with its 'Swift' type 15.2-m (50-ft) patrol boats marked a great improvement in counter-insurgency tactics. The Swifts were driven by diesel engines and were armed with light automatic weapons. Then came the US Navy's 'Asheville' class gunboats, larger and more sophisticated but still useful for working in shallow water. The 'Ashevilles' were driven by combined diesel or gas turbine (CODOG) machinery and were armed with a single rapid-firing 76-mm (3-in) gun forward.

The opportunity was also taken to try out an experimental hydrofoil, the 64-ton *Tucumcari*, which could travel at very high speed on her foils, if required to catch a Viet Cong junk. However, it soon became clear that too much technology was being deployed against puny opposition. What was also clear was that operations must be extended to include the rivers, for the Viet Cong were operating there with impunity. On 18 December 1965 a new River Patrol Force, codenamed 'Game Warden' was set up as Task Force 116. As before it was under the command of Rear Admiral Ward as Commander-in-Chief, Naval Advisory Group.

The inshore patrols were stepped up in October 1966, in conjunction with the US Air Force's 'Rolling Thunder' offensive. The operation, codenamed 'Sea Dragon', was initially limited to 17° 30′ North, but when the North Vietnamese responded by deploying coastal artillery the line was moved to 18° North, and by February 1967 it was 20° North. In the following October the 'Game Warden' patrols were reinforced by Helicopter Support Squadron One, the 'Seawolves' flying Bell UH-1 'Huey' ground-support helicopters. They made a deadly combination with the 40 river patrol craft in the Rung Sat and 80 operating in the Mekong Delta.

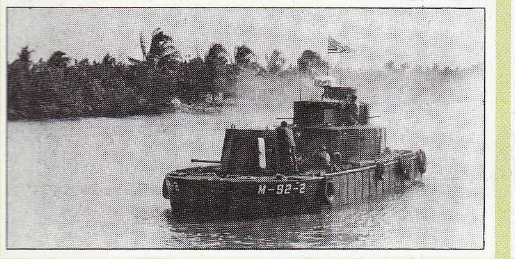
Despite all the efforts, the political war was already lost when at the end of March 1968 President Johnson called a halt to bombing north of the 28th parallel; eight months later all attacks on North Vietnam were halted as well. In February 1969 virtually the entire riverine force (242 'Game Warden' and 'Market Time' craft worth an estimated $7.7 million) was turned over to the South Vietnamese navy, to begin the hurried process of 'Vietnamization'. It was a hopeless task to try to inculcate efficiency on anything like the scale that the US naval forces had demonstrated, but there was no alternative. The Mobile Riverine Force was formally disbanded in August 1969, and in its place was left SEALORDS, the South East Asian Lake/Ocean River Delta Strategy, a grand-sounding name for the force.

It was not the end of the story, however, for in April 1970 the South Vietnamese military command in Saigon launched a major attack on Viet Cong sanctuaries in Cambodia. As part of this offensive it was essential to keep the Mekong River open, for it flows from Phnom Penh down into Vietnam. In May Cambodian forces failed in their attempt to open the Mekong, but a flotilla of South Vietnamese gunboats succeeded in fighting its way through. When the great offensive finally petered out, possession of the river route became even more crucial as a means of evacuating large numbers of people.

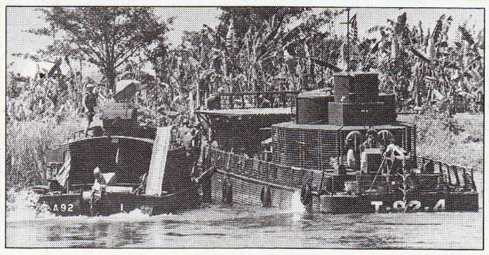
The 'Game Warden' craft were to patrol the Rung Sat, a swamp which lies between Saigon and the sea, as well as the Mekong Delta. Special river patrol boats were built of fibreglass, drawing only 0.3 m (1 ft) of water but capable of 25 knots. A number of elderly ex-French landing craft were also pressed into service, having performed a similar function against the Viet Minh in the early 1950s. Modern landing craft were converted to 'monitors', and a series of steel-hulled assault boats was begun. These mounted an impressive armament, including 81-mm mortars, 20-mm cannon and flamethrowers.

A typical riverine operation involved floating barracks and supply barges, known as the Mobile Afloat Force (MAF). While at anchor the MAF was protected by assault support patrol boats (ASPBs) and monitors, and was known as the Mobile Riverine Base (MRB). The MAF would normally operate up to 48 km (30 miles) from its main base, and in ideal circumstances operated in conjunction with US Army units ashore. The task of the ASPBs was to interdict attempts by the Viet Cong to withdraw by water, and covering fire could be called down from the Fire Support Base, and from helicopters and tactical aircraft. Armoured troop carriers (ATCs) were also to be used to land assault troops, in conjunction with US Army troops on the landward side, interdicting withdrawal overland.

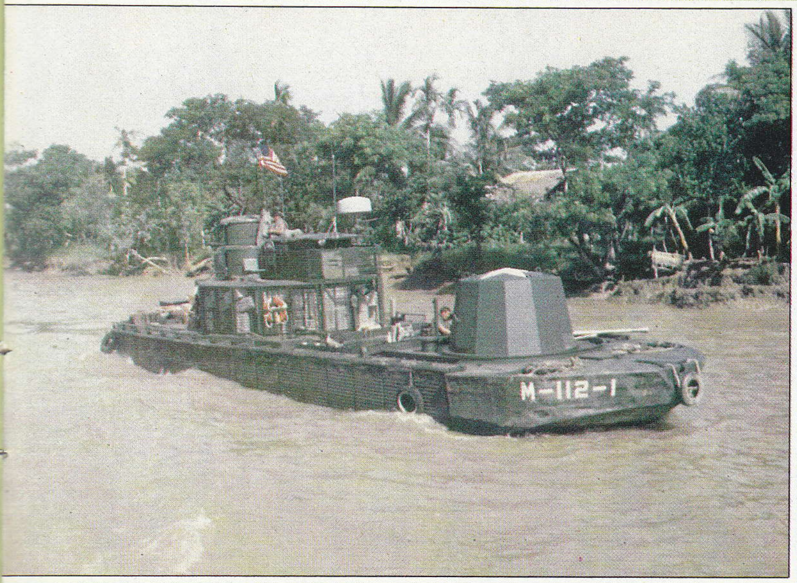
Little is known of the last days following the American withdrawal in 1972, but the river forces undoubtedly succumbed to the same chaos and collapse of morale which overtook the South Vietnamese land forces when the North Vietnamese tide rolled over them. Some units fought on to the end, and after the fall of Saigon in April 1973 a number of craft made their escape, packed with refugees. The majority, however, fell into North Vietnamese hands, and official US intelligence estimates put the total at over 500 ex-US and ex-French craft in Communist hands. Many must have been worn out and short of vital spares, but a considerable number are almost certainly still in use.



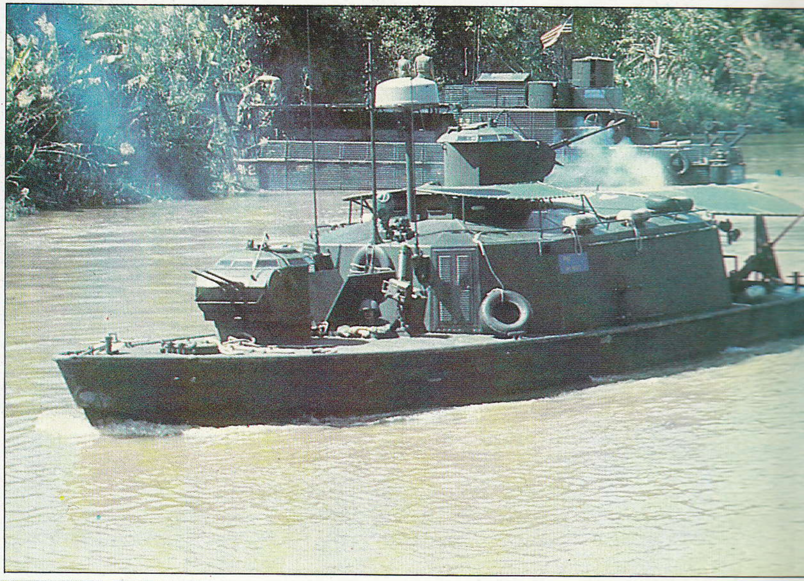
Nicknamed the 'Battleships of the Delta', the USA's river monitors found that their heavy gun armament was particularly useful in destroying riverside bunkers that were impervious to small arms fire.



An Assault Support Patrol Boat pulls alongside an Armoured Troop Carrier during a patrol in the Mekong Delta waterways. Armament of the ASPB could include machine-guns, cannon and 40-mm grenade-launchers.



The Monitor proved to be a useful fire support vessel during the Vietnam war, especially when ambushes were sprung on river convoys or patrols. The vast majority were eventually turned over to the South Vietnamese.

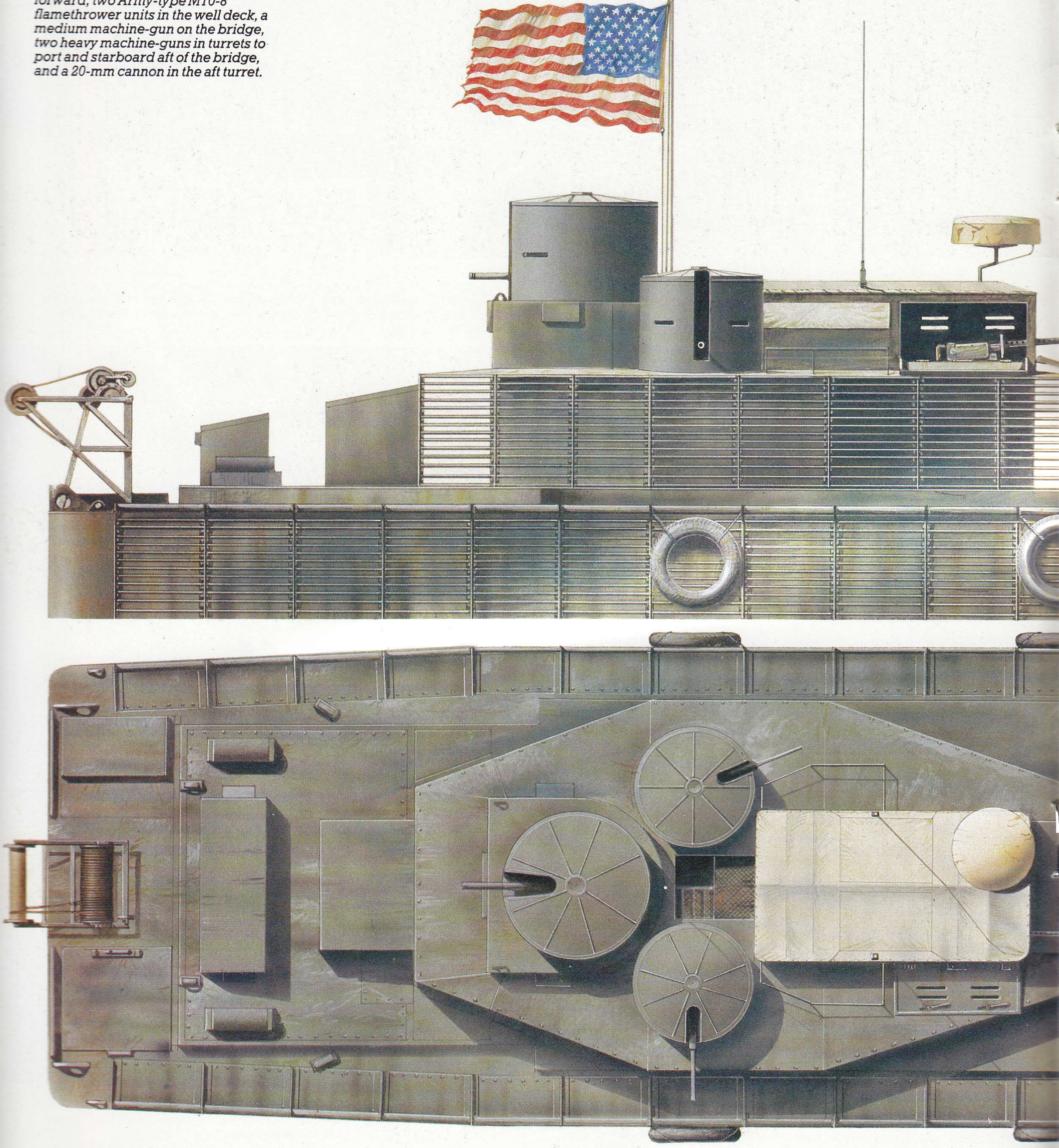


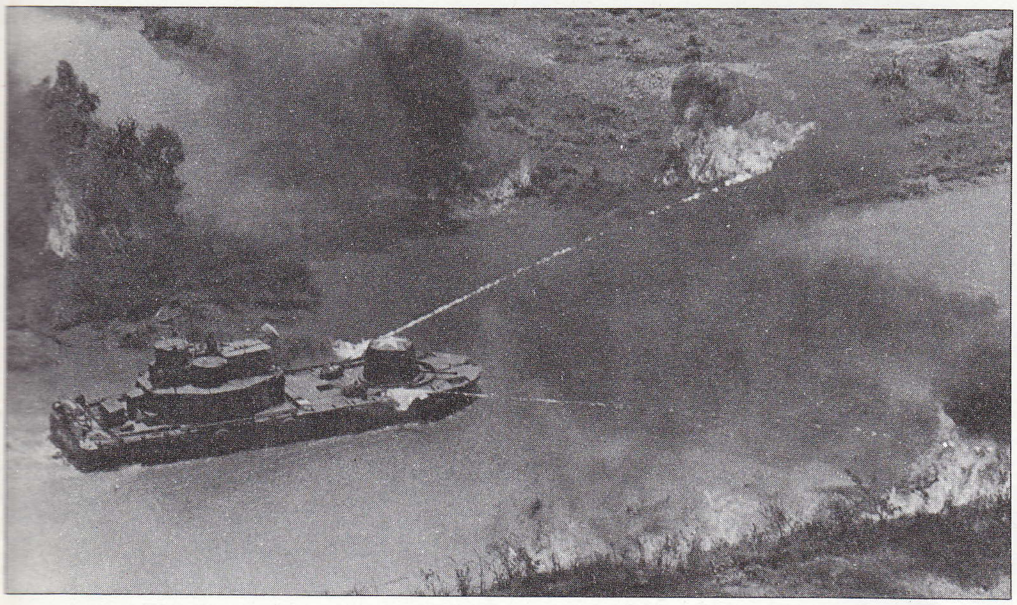
The only craft specially designed by the US Navy for riverine warfare was the Assault Support Patrol Boat; all the others were based on conversions of landing craft.

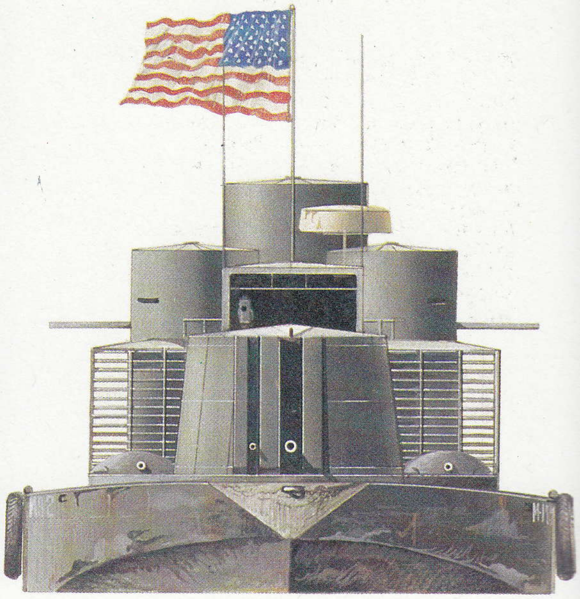
Pandemonium breaks out as an Assault Support Patrol Boat beaches after being holed by Viet Cong mines or gunfire. Frantic efforts are under way to repair the damage, while other members of the crew return enemy fire using the heavy machine-gun and small arms. These dramatic events were recorded in the Mekong Delta area in June 1968, but were typical of riverine warfare throughout 12 years of US involvement.

Monitor Mk V

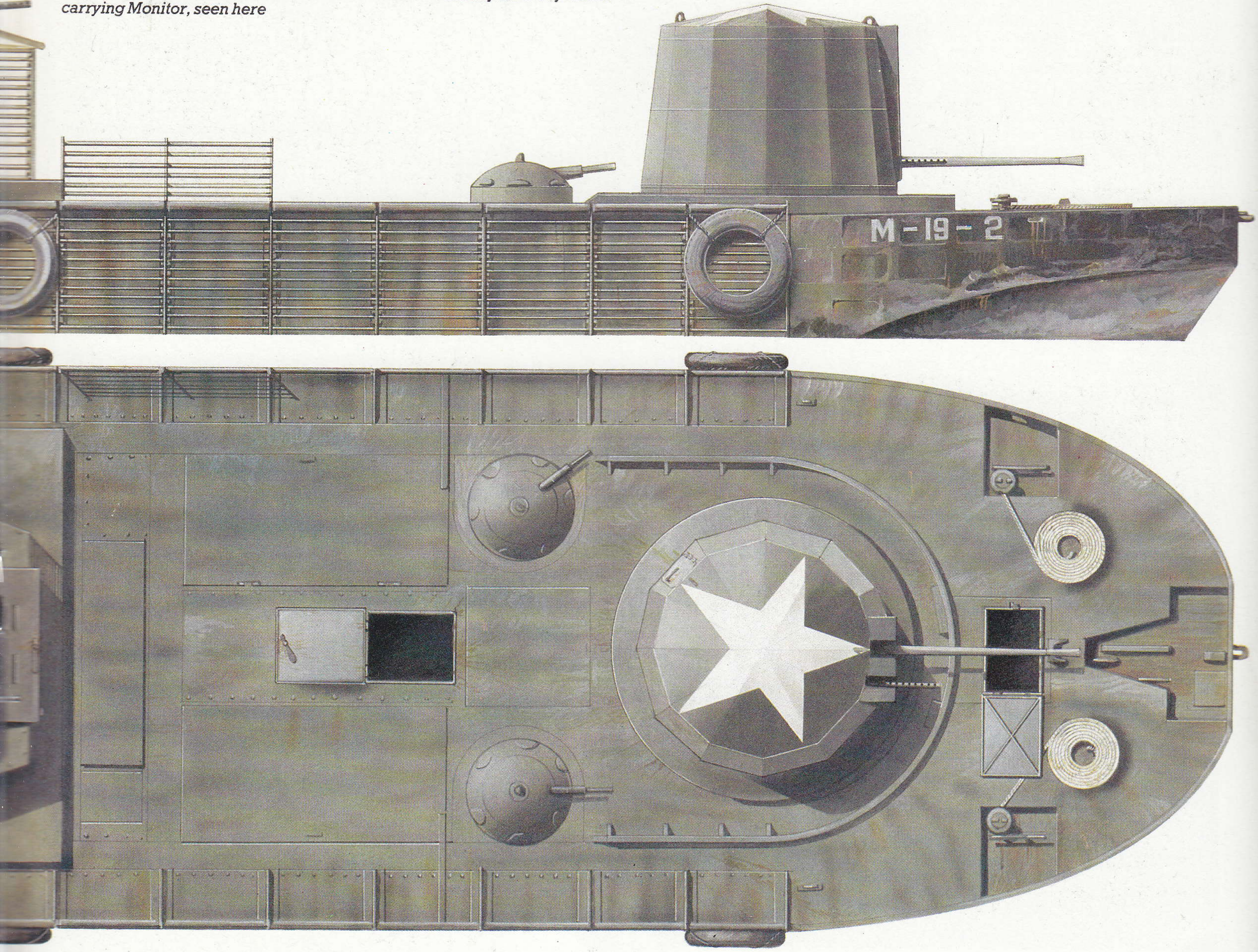
Below: The specially-constructed Monitor Mk V version of the riverine warfare monitor. It differed from the earlier version in having rounded bows instead of the landing craft bow door arrangement. The vessel is equipped with a 40-mm gun forward, two Army-type M10-8 flamethrower units in the well deck, a medium machine-gun on the bridge, two heavy machine-guns in turrets to port and starboard aft of the bridge, and a 20-mm cannon in the aft turret.







Above: One of the perils of the Mekong fighting was the ever-present threat of ambush. A potent response was the flamethrower-carrying Monitor, seen here destroying possible enemy ambush sites along a narrow stream in the Delta. The flamethrowers are converted US Army M10-8 systems.

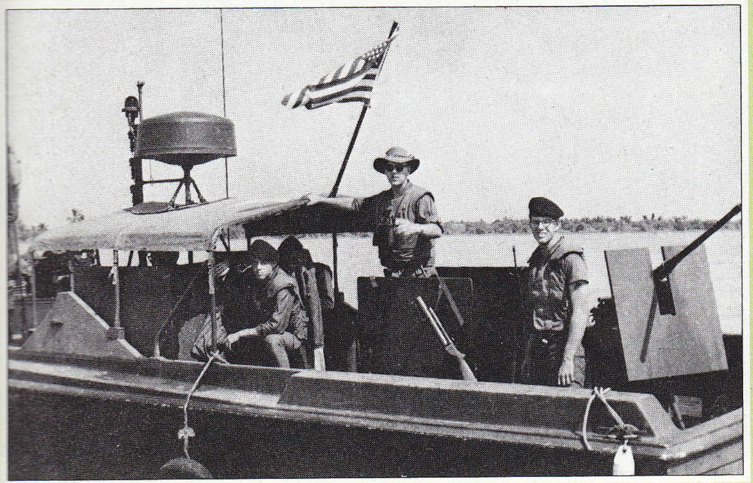


Surprise on the Mekong

There were many dramatic incidents during the American operations in the Mekong Delta. The following is a first-hand account of just one of many operations undertaken by an American naval serviceman during that war.

It had been a long night, that night of 26 February 1966. I had the dawn watch on the coxswain flat. Even the radio had been dead. Base control had called for our coded position just after I had taken the wheel and that was the last transmission I had heard for nearly two hours.

It was 07.00 when I awakened the patrol officer, Bill Jump, and the boat captain, Benny Benson. We ate a few hot C-Rations we had heated on the exhaust manifolds of the engines. At 07.15 I got on the radio and called for our cover boat to meet us up-river. As I operated the radio, I was looking over to the south side of the river, where I noticed an object that seemed to be anchored to the bottom, for it was holding its position even though the tide was moving out at over 12 kts. I hung the radio mike back in its rack and picked up the binoculars from the console dash. Through the fifty-power glasses, it looked like a large coconut wrapped in wire mesh, and if our cover boat came up-river running the beach, it would hit it before the crew had seen it. I called Jump's attention to it. He got out an M79 grenade-launcher and and fired a round at it. John Sweatman was on the forward gun mount. I passed the other M79 up to him. John fired four rounds and Jump fired seven before they finally got a hit, and even then it was not a direct hit. Jump scored slightly to the left of the 'coconut' and it exploded with a loud report. There was a large cloud of black smoke which indicated it had contained a black powder charge. It was not really a big enough charge even to damage a fast moving PBR, but it was certainly enough to scare the hell out of the crew in just another example of Viet Cong harassment. I made a note of the object for debriefing purposes.



The crew of PBR 125 on the Cua Tien river, east of My Tho during a brief stopover during December 1966. The weapons of the boat were supplemented by the small arms of the crew.

At 07.40 the anchor was pulled up, and we started up river at 1,500 revolutions. It was already getting hot, and the air was very still.

At 08.00 I went forward and relieved John on the main gun mount. By 09.00 we had made rendezvous with *PBR 125*. We then moved together upstream to the fish stakes near the eastern end of the coconut grove. I looped our bow line around the main support to the stakes, and the 125 boat came in and tied up alongside of our starboard side. A breeze of sorts started to blow in from the South China Sea and we were able to relax. Not a single boat or barge moved on the river. That should have been our first warning that something was wrong, but it went unheeded.

VC contact

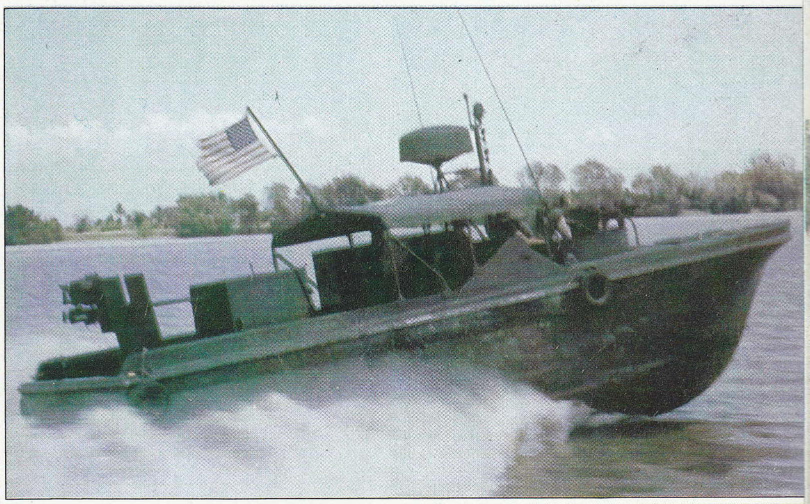
It was 11.30. We could leave station at 12.00, so we cast off and started up river at a slow idle. We took the lead in the 131 boat. The 125 boat fell in column behind us at 275 m (300 yards). I was the first on our boat to hear it, and the 125 boat never did say anything over the radio in the form of a warning. The wind from the sea brought the noise in loud and clear. I knew what it was even before I turned to look off the port quarter: three propeller-driven aircraft spreading out into attack positions. Their run would be from north east to south west. I yelled that we were not the target considering the angle of attack. They were now almost nose on to us at this stage of the attack and thus identification was as yet next to impossible. The aircraft on the eastern side of the formation broke from its 11 o'clock position and moved over to the 10 o'clock slot the better to cover his comrades. As he turned, I could see 227-kg (500-lb) bombs hanging under his belly. They were fighter-bombers, and I called out that I could see tiger skin markings on the fuselage. The aircraft were Douglas A-1 Skyraiders of the South Vietnamese 519th Attack Group out of Can Tho. They passed over our stern, going right between our two boats, at tree-top level, and 365 m (400 yards) into the coconut grove the first bomb exploded, and the remains of a hut wall and most of its roof were hurled into the air. Within a very few minutes the whole grove was covered with pinkish-purple smoke. Intelligence had advised that there were no large Viet Cong forces in Go Kong province at the time. I had not much faith in our intelligence, and those 'fly boys' just about wrapped it up. US intelligence in the Mekong Delta left a lot to be desired. The aircraft looped around and started a second bombing run. This time they dropped their bombs 180 m (200 yards) from the beach. The enemy was moving towards us. We were, at this time, just opposite the canal that led up into the coconut grove. There was a cracking sound up forward near the tip of the bow. I saw fibreglass fragments flying off from the port side of the boat and realized that bullets were passing through the hull from starboard to port. I fired several rounds with my M16 at where I thought the fire was coming from. The patrol officer called out: 'All guns to starboard! Stand by!' I put the rifle down and released the brake to the twin fifties (12.7-mm/0.5-in guns), swung them towards the beach and waited for the order to commence fire.

Firefight

I looked back across the boat to be sure there was someone to order the firing. Shells and bullets were hitting all around the boat but none of us had been hit yet. The small arms fire was growing more intense all the time, and at last Jump finally called out: 'Fire.'

I pushed down on the trigger mechanism. It was like the crack of doom. The guns jarred, vibrated and spat forth their message. I was spraying every spot I thought might hide a gun emplacement.

Between bursts of gunfire I could here the radio transmitting: 'Druid Alfa One to Druid Alfa: Bullets are landing all around you; speed up!!! Look out, machine firing at your stern!'



PBR 125 at speed while on patrol in the Delta. These vessels saw a good deal of action, losing a number of craft to enemy mines, small arms, rocket-propelled grenades and recoilless rifle fire.

Jump called across the emergency frequency for Alfa One to clear the primary radio band.

I felt the boat increase in speed as revolutions built up from 500 to 1,500. At that speed the boat answers the wheel fairly well and yet is still travelling slowly enough for the gunners to shoot straight and true.

I had to stop firing to straighten a twisted ammo belt and again I could hear the radio as Jump talked to the CO: 'Druid Alfa to Druid Base: We have run up on a large size force of VC attempting to cross the river to avoid an air strike. We need assistance as soon as possible. Vietnamese Skyraiders are overhead at this time but they are low on bombs.'

'Druid Base to Druid Alfa: Be advised will sortie afternoon patrol early. It will still be over an hour before we can get help to your location. Can you hold the enemy pinned to the beaches?'

'Druid Alfa to Druid Base: Jim [Lieutenant Lindsey], I don't know. We're using up ammo pretty quick and were under intense fire from rifles and machine-gun emplacements. Can you get hold of Andy 88 and send him over? If he can get us more air support then we can possibly hold them for a while.' 'Druid Base to Druid Alfa: Will do, Jump. Can you advise how big a force you are up against?'

I had the guns cleared and returned to firing. Everywhere I looked the VC were running. You could hardly decide where to shoot next. I took a quick look back at the 125 boat just as a column of water cascaded down on her. They were not getting off too lightly either.

By now we had run from the canal at the eastern end of the coconut grove to within 180 m (200 yards) of the rice mill at the western end. That was a distance of over 3000 m (3,280 yards), well over a mile and a half of enemy beach-head. We turned out to mid-river to rearm our guns and check on our battle damages.

In one long firing run we had used up nearly a third of our entire ammuni-

A PBR at speed in company with a US Navy Bell UH-1 Iroquois helicopter during a sweep of a Delta river. Working together, attacks would often be made from the air as well as from the water.

tion supply. Benny had completely expended the ammunition for the M60 light machine-gun. Before we finished this day we would be down to using the captured weapons we had on board.

We decided we had to conserve ammunition until the other patrol could arrive. Thus we decided to concentrate on the heavy gun emplacements with only occasional heavy barrages. It would not be easy to let those riflemen snipe at us, but we had to keep the VC from moving out until we had enough ammunition to shoot anything and everything that moved. This was the only drawback to PBRs having to patrol with small quantities of ammunition on board: we had the speed but we were poorly prepared to fight a prolonged engagement. Unfortunately that was exactly what we were now being called upon to do.

We had our guns reloaded and started back in towards the beach and all those VC guns. We tried to keep the firing to a minimum but 'Charlie' must have been wise to us, or he was listening in on our radio frequency and knew our plan. At any rate, he started hitting us harder than ever. Bullets were sailing through the hull and bouncing off the armour plate. Luck had been with us so far, but we could not rely on it lasting forever. As yet no one on either boat had been hit, but we were running the odds against our favour. Shortage of ammunition or not, we were forced to return concentrated fire again.

Heavy exchanges

We were laying down a heavy barrage of automatic fire and yet the return fire was growing more intense all the time. Jump yelled at me to spray the tree tops. I brought the 'fifties' to bear. Coconuts and palm branches started flying. Suddenly a body dropped from one of the trees. Jump was right. The incoming fire momentarily stopped. The Skyraiders had expended all their bombs and were now strafing the beaches. Andy 88 came on the radio and advised he was overhead and that three North American F-100 Super Sabres were on the way from Saigon. The Skyraiders made one last pass over the beaches, looped over the target and flew off to the south west. Andy 88 advised that the jets would be along in another five minutes. The firing picked up as soon as the Skyraiders left. As we approached the west end of the coconut grove several VC ran out onto the beach and headed for a large junk partially hidden at the water's edge in the undergrowth. We turned all guns on it and opened up. I hit the lead man and he was knocked to the ground. The aft 'fifty' and the 'thirty' were dealing with the rest of the VC soldiers so I turned the twin 'fifties' on the junk itself. I could see two gun barrels pointed out of the portholes to the rear of the wheelhouse. A BAR (Browning Automatic Rifle) started firing from one of them. The bullets struck the water and were walking out towards us. Just as the line of fire reached the hull of our boat, it stopped. The clip had run out. He started a second clip at the same point and attempted to walk in again. Once more, just as the line of fire reached the hull, the clip ran out. Before he learned to correct his fire, I pushed down on the trigger bar and started walking my fire in. The fifth or sixth round caught the bow square and I continued to fire without letting up.

The narrow confines of some of the canal areas in which the PBRs had to operate were ideal territory for 'Charlie' and his lethal ambushes.

The 'fifties' rattled and shook. The smell of burning powder grew strong in the air. I could see large chunks of the hull flying off into the air. The incendiary ammunition finally set light to the fuel and the junk was enveloped in flames. Then the old oil in the bilges started burning, and thick black smoke filled the sky.

We again returned to mid-river to rearm the guns. The Super Sabres were rolling in now so we stayed out in the river as they bombed and strafed for the next half hour. As they re-formed to return to Saigon, they advised they would get more bombs and return. There were plenty of VC still running amok.

As soon as the jets left, the VC regrouped and once again we came under heavy fire, as there were several machine-gun emplacements still untouched by the bombing. We were also getting heavy rifle fire from the centre of the grove. Benny yelled up to hit the tree tops with M79 grenades. Sweatman opened up with the belt-fed launcher and the rifle fire suddenly stopped. Benny had realized that the VC were hidden down behind the embankments along the beach where our gunfire could not possibly get at them, but where they were vulnerable to the shrapnel of M79 grenades raining down on them, forcing them to abandon their positions.

Low ammunition

For over two and one half hours, in the hot afternoon sun, we fought with the VC beach emplacements. Every time we saw a sampan or junk hidden in the underbrush, we would shoot up the hull so they could not use it to come out and attack us in mid-river or to use it to escape down river.

We were running very low on ammunition by now. Jump called on the radio for the outcoming patrol's location. They were only a little over half way to our position and one of the boats was experiencing bilge-pump difficulty. It was taking enough water to slow it down. The other boat picked up some of its ammunition and continued on at high speed to our assistance. The first boat finally had to come to and repair the faulty bilge pump.

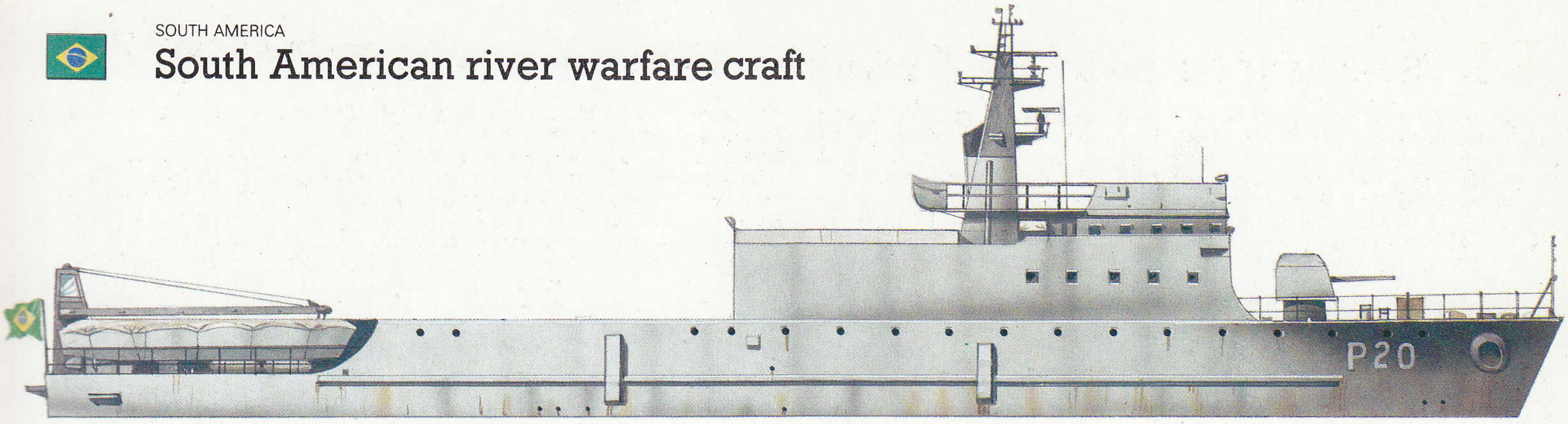
It was still 15 minutes before we spotted the approaching boat. It was John Gilman's PBR 142. By now I was using my old 'Tommy' gun. Benny was using an AK-47 and John Sweatman was using a ChiCom that had been converted to fire 308 ammunition. Jump turned the boat up river to meet the 142. They came in alongside and started passing ammunition over even as we headed back into the VC fire zone. We rearmed the 'fifties' as the 142 boat went up the line to meet the 125 boat. When all three boats were ready we moved in to make the kill. As we were closing the beach Andy 88 advised that the Super Sabres had arrived again above the target area. Jump advised him that we would make a co-ordinated attack. Now the Viet Cong found themselves confronted from the sea and air at the same time. The jets roared in over our radio antennae to drop their deadly payloads. We were now in close enough to help call the locations of the gun emplacements. We were also close enough to hit the buildings in the jungle effectively, and before long six of them were on fire. There were secondary explosions in four of them. We then made a slow run along the beach continuously levelling concentrated fire into the enemy positions. As we did this, the jets strafed the grove with 20-mm cannon fire.

By 16.00 we were finally headed home, passing the 139 boat en route. They now had their bilge pump repaired and were headed down to join the 142 boat. They were a unhappy crew, having missed the whole fight.

We docked at the pier at 15.30 and, to our surprise, we were taken up to the hotel to a big steak dinner that the CO had gotten fixed for us. It was quite a day. We truly felt we had accomplished something on this day.

Two weeks later an intelligence report came in from Saigon informing us that a document had been captured by a SEAL team operating in Go Cong Province that stated the Viet Cong had lost 54 killed and 27 wounded in the battle of 26 February at the coconut grove. It did not make mention of material damage done.

South American river warfare craft



Pedro Teixeira, one of the Brazilian vessels designed for use on the Amazon. It can carry a light Bell JetRanger helicopter and two armed LCVPs for use in the region. This large, corvette-sized vessel forms part of the Amazon Flotilla.

The Amazon and the other large rivers of South America provide one of the last havens for the river gunboat and its modern day counterparts. Brazil, Colombia, Peru and landlocked Paraguay all have such craft in service. The Brazilians have the largest fleet with five vessels (two **'Pedro Teixeira' class** and three **'Roraima' class** patrol ships) in the Amazon flotilla and one **'Thornycroft' type** river monitor in the Matto Grosso flotilla. The latter dates from the 1930s. Colombia utilizes two **'Arauca'** class patrol craft dating from the 1950s and a **'Baranquilla' class** river gunboat built in 1930. Peru has four purpose-built (two **'Maranon'** class and two **'Loreto' class**) gunboats for use on the upper Amazon. Paraguay has two purpose-built **'Humaita' class** river-defence ships, three **'Bouchard' class** converted ex-Argentinian minesweepers, and a 1908-vintage converted tug for use on its internal river systems.

Recently Brazil has built a new gunboat based on one of its designs for Paraguay. The five Brazilian vessels belonging to its Amazon flotilla are by far the most modern with the two 'Pedro Teixeira' craft carrying a light helicopter in a hangar and two LCVPs to land troops if required. The smaller 'Roraimas' carry only a single LCVP and no helicopter. Brief characteristics of all the purpose-built craft are given in the accompanying specifications. Colombia also has a third 'Arauca' class vessel which has been disarmed and equipped as a floating hospital for use on the country's rivers. Brazil is known to be interested in building further craft for use on its rivers; a design between the 'Pedros Teixeira' and 'Roraima' classes in size is believed to be under construction.

Specification
'Pedro Teixeira' class
Names: *Pedro Teixeira* and *Raposo Tavares*
Displacement: 700 tons full load
Dimensions: length 62.0 m (203.4 ft); beam 9.35 m (30.7 ft); draught 1.65 m (5.4 ft)
Propulsion: two diesels delivering 3,840 hp (2865 kW) to two shafts
Maximum speed: 16 kts
Complement: 78
Armament: one 40-mm AA gun, two single 81-mm mortars, six single 12.7-mm (0.5-in) heavy machine-guns, one helicopter and two LCVPs
Electronics: two navigational radars
Built: 1972-3

Specification
'Thornycroft' type
Name: *Parnaiba*
Displacement: 720 tons full load
Dimensions: length 55.0 m (180.5 ft); beam 10.1 m (33.3 ft); draught 1.6 m (5.1 ft)
Propulsion: two Thornycroft triple-expansion steam engines delivering 1,300 hp (970 kW) to two shafts
Maximum speed: 12 kts
Complement: 90
Armament: one 76-mm (3-in) dual-purpose, two single 47-mm, two six 40-mm AA and six single 20-mm AA guns
Electronics: none
Built: 1937

Specification
'Roraima' class
Names: *Roraima*, *Rondonia* and *Amapa*
Displacement: 365 tons full load
Dimensions: length 45.0 m (147.6 ft); beam 8.45 m (27.7 ft); draught 1.37 m (4.5 ft)
Propulsion: two diesels delivering 912 hp (680 kW) to two shafts
Maximum speed: 14.5 kts
Complement: 63
Armament: one 40-mm AA gun, two single 81-mm mortars, six single 12.7-mm (0.5-in) heavy machine-guns and one LCVP
Electronics: three navigational radars
Built: 1975-6

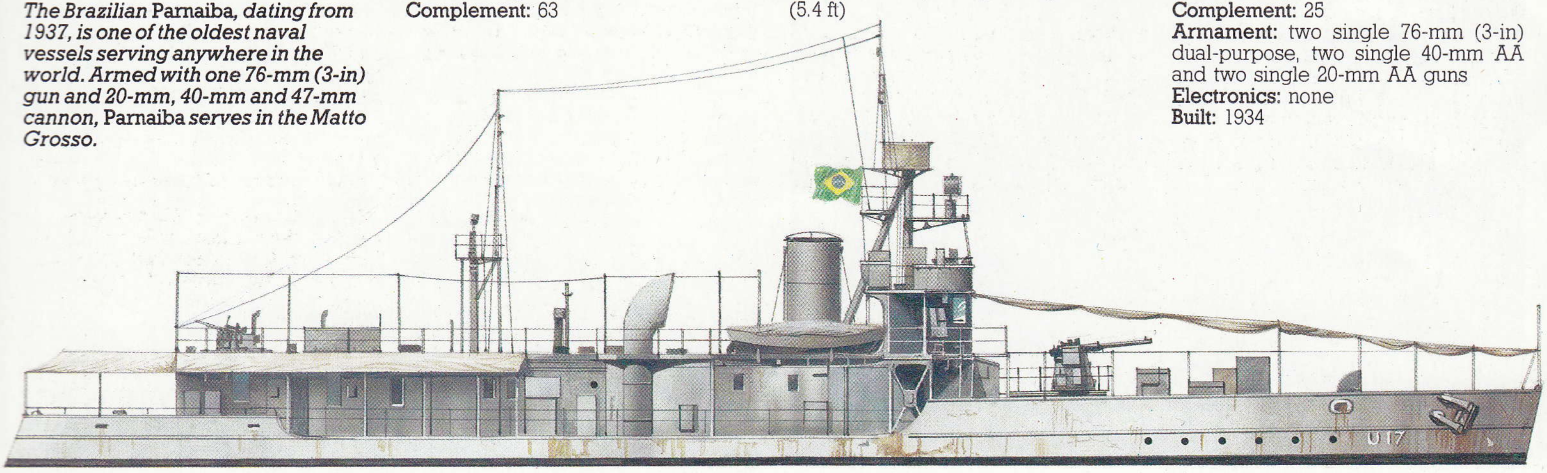
Specification
'Arauca' class
Names: *Rio Hacha* and *Arauca*
Displacement: 184 tons full load
Dimensions: length 47.25 m (155 ft); beam 8.23 m (27 ft); draught 1.0 m (3.3 ft)
Propulsion: two Caterpillar diesels delivering 800 hp (597 kW) to two shafts
Maximum speed: 13 kts
Complement: 43
Armament: two single 76-mm (3-in) dual-purpose and four single 20-mm AA guns
Electronics: none
Built: 1955

Specification
'Barranquilla' class
Name: *Cartagena*
Displacement: 142 tons full load
Dimensions: length 41.9 m (137.5 ft); beam 7.16 m (24.5 ft); draught 0.8 m (2.6 ft)
Propulsion: two Gardner diesels delivering 600 hp (448 kW) to two shafts
Maximum speed: 15.5 kts
Complement: 39
Armament: two single 76-mm (3-in) and one 20-mm AA guns, and four single 7.7-mm (0.3-in) machine-guns
Electronics: none
Built: 1930

Specification
'Humaita' class
Names: *Paraguay* and Humaita
Displacement: 865 tons full load
Dimensions: length 70.15 m (230.2 ft); beam 10.7 m (35.1 ft); draught 1.65 m (5.4 ft)
Propulsion: two Parsons geared steam turbines delivering 3,800 hp (2835 kW) to two shafts
Maximum speed: 17.5 kts
Complement: 86
Armament: two twin 120-mm (4.7-in), three single 76-mm (3-in) AA and two single 40-mm AA guns, plus six mines
Electronics: none
Built: 1931

Specification
'Maranon' class
Names: *Maranon* and *Ucayali*
Displacement: 365 tons full load
Dimensions: length 47.22 m (154.8 ft); beam 9.75 m (32 ft); draught 1.22 m (4 ft)
Propulsion: two British Polar diesels delivering 800 hp (597 kW) to two shafts
Maximum speed: 12 kts
Complement: 40
Armament: two single 76-mm (3-in) dual-purpose and two twin 20-mm AA guns
Electronics: none
Built: 1951

Specification
'Loreto' class
Names: *Amazonas* and *Loreto*
Displacement: 250 tons full load
Dimensions: length 46.7 m (153.2 ft); beam 6.7 m (22 ft); draught 1.2 m (4 ft)
Propulsion: two diesels delivering 750 hp (560 kW) to two shafts
Maximum speed: 15 kts
Complement: 25
Armament: two single 76-mm (3-in) dual-purpose, two single 40-mm AA and two single 20-mm AA guns
Electronics: none
Built: 1934



The Brazilian* Parnaiba*, dating from 1937, is one of the oldest naval vessels serving anywhere in the world. Armed with one 76-mm (3-in) gun and 20-mm, 40-mm and 47-mm cannon,* Parnaiba *serves in the Matto Grosso.

ITALY

'Sparviero' class fast attack hydrofoil (missile)

Together with the United States Navy, Italy is unique among NATO navies in having missile-armed hydrofoils as part of its operational surface fleet. The prototype of the **'Sparviero' class** was based on the Boeing Tucumcari design and assessed in detail by the Alinavi Society, which was formed in 1964 by the Italian government's IRI, Carlo Rodriguez (a builder of commercial hydrofoils) of Messina and the US Boeing Company. Built between 1971 and 1974, the original craft was followed by six others between 1980 and 1983. They use the Boeing jetfoil system, with one foil forward and two aft. Power for the foilborne mode comes from a gas turbine driving a waterjet system, whilst hullborne power comes from a single diesel. The hull is made entirely of aluminium, and it has been found that the craft have a relatively short range and limited armament for combat operations. However, the Italian navy is willing to accept this as Italy is surrounded by restricted waters ideal for such craft.

The six later vessels have a more modern surface search radar than the *Sparviero*, and also carry the later 150-km (93-mile) range Teseo Mk 2 SSM variant of the Otomat SSM, though use of this extra range capability requires a helicopter for mid-course guidance and targeting. The radar is fitted with an IFF interrogator unit, and the gun armament is a single OTO-Melara 76-mm (3-in) dual-purpose gun forward.

Specification

Names: *Sparviero, Nibbio, Falcone, Astore, Grifone, Gheppio* and *Condore*

Displacement: 62.5 tons full load

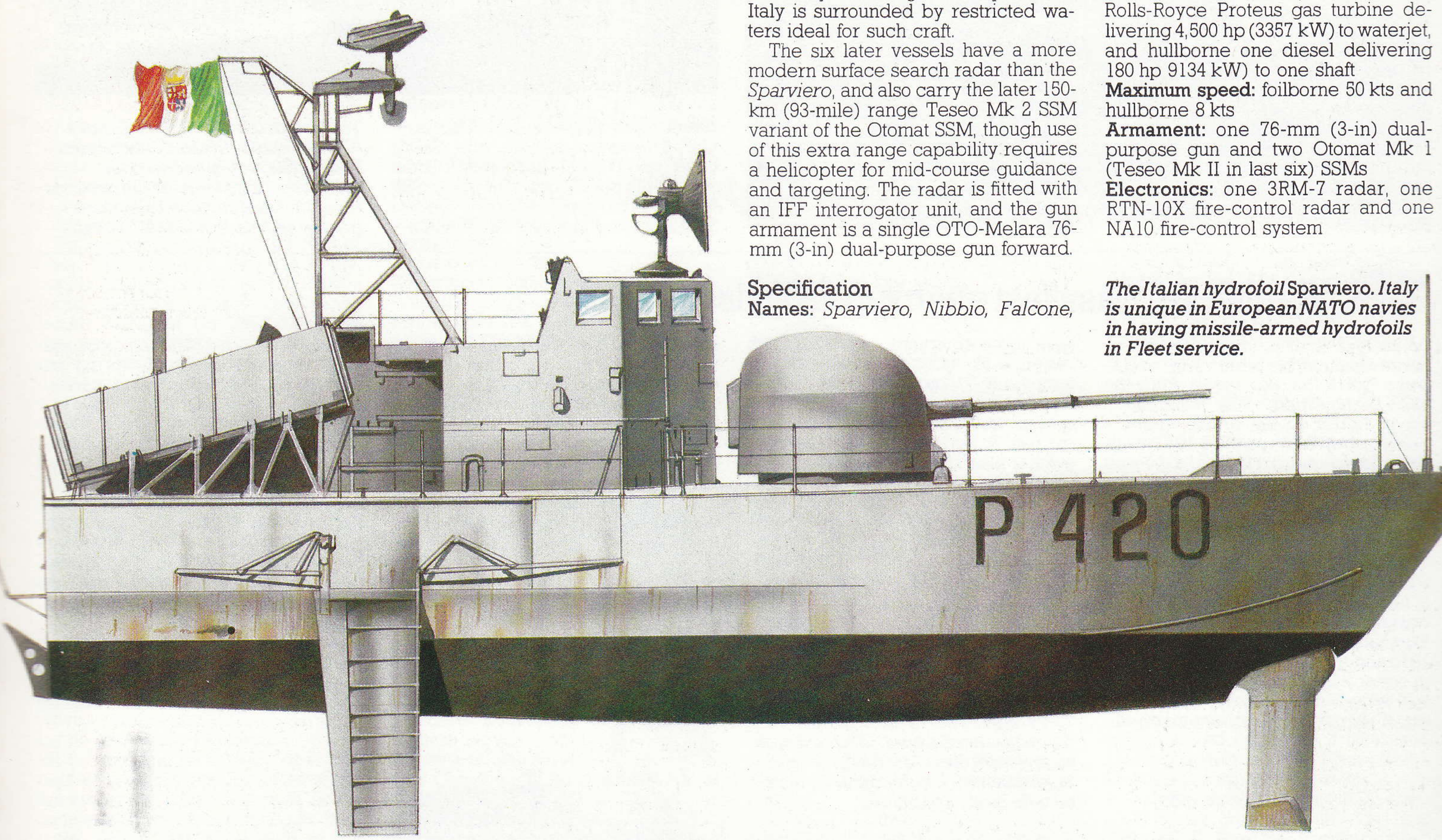
Dimensions: hull length 23.0 m (75.4 ft), beam 7.0 m (22.9 ft) and draught 1.6 m (5.2 ft); foilborne length 24.6 m (80.7 ft) and beam 12.1 m (39.7 ft)

Propulsion: CODOG (COmbined Diesel Or Gas turbine), foilborne one Rolls-Royce Proteus gas turbine delivering 4,500 hp (3357 kW) to waterjet, and hullborne one diesel delivering 180 hp 9134 kW) to one shaft

Maximum speed: foilborne 50 kts and hullborne 8 kts

Armament: one 76-mm (3-in) dual-purpose gun and two Otomat Mk 1 (Teseo Mk II in last six) SSMs

Electronics: one 3RM-7 radar, one RTN-10X fire-control radar and one NA10 fire-control system



The Italian hydrofoil Sparviero. *Italy is unique in European NATO navies in having missile-armed hydrofoils in Fleet service.*

FRANCE

'Combattante II' and 'Combattante III' class fast attack craft (missile)

Surprisingly enough, the French navy has not adopted either the **'Combattante II' class** or the **'Combattante III' class** for its own use. The 'Combattante II' class is reported to be derived from a West German Lürssen design and, together with its larger version, has proved very popular with a number of navies. The hull is made of steel whilst the superstructure is made of light alloys. The versatility in the design allows the operator country to choose its own electronics and weapon fits, although the French tend to be a lot happier if its Thomson-CSF fire-control systems and radars with Aérospatiale MM38 or MM40 Exocet SSMs are selected. At present the following countries have the 'Combattante II' in service: Greece (four with MM38s), Iran (12 with Harpoon SSMs), Libya (10 with Otomat SSMs) and Malaysia (four with MM38s). The Iranian craft, known as the **'Kaman' class,** are seeing extensive service in the current Iranian-Iraqi Gulf War, at least two and a 1,135-ton frigate having been lost to AM39 Exocets air-launched from Aérospatiale Super Frelon helicopters flown by the Iraqi air force. The craft have apparently launched several Harpoons against Iraqi naval ships, with at least one 'Polnocny' LSM and several 'P6' MTBs being sunk by them.

Both the 'Combattante II' and the larger steel-hulled 'Combattante III' have excellent habitability, the latter being designed for longer endurance and to act as command ships for smaller craft. The 'Combattante III' has been adopted by Greece (four with MM38s plus six locally built with cheaper machinery, electronics and missile fit of Penguin Mk II SSMs), Nigeria (three with MM38s) and Tunisia (three with MM40s). Typical class characteristics are given in the accompanying specifications. The builder for both versions is CNM at Cherbourg. The Greek 'Combattante IIIs' of the first type differ from the rest in having two rearward-firing 533-mm (21-in) torpedo tubes. These carry the West German SST4 wire-guided anti-ship active/passive acoustic homing torpedo with a warhead of 260 kg (573 lb) and maximum range of about 20 km (12.4 miles).

Specification

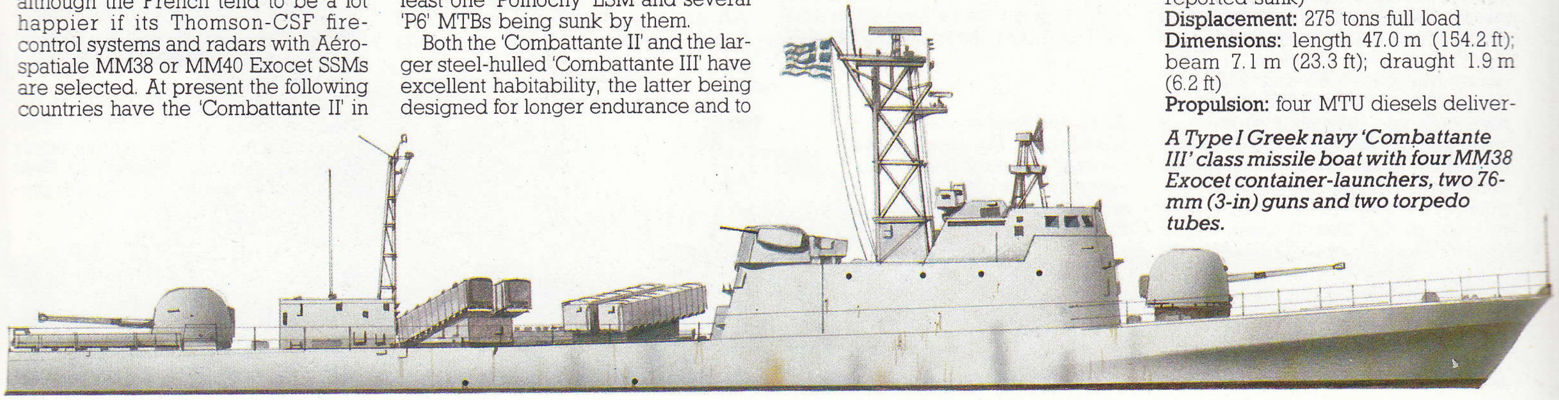
'Combattante II' or 'Kaman' class

Names: *Kaman, Zoubin, Khadang, Peykan, Joshan, Falakhon, Shamshir, Gorz, Gardouneh, Khanjar, Heyzeh* and *Tabarzin* (minus at least one craft reported sunk)

Displacement: 275 tons full load

Dimensions: length 47.0 m (154.2 ft); beam 7.1 m (23.3 ft); draught 1.9 m (6.2 ft)

Propulsion: four MTU diesels deliver-

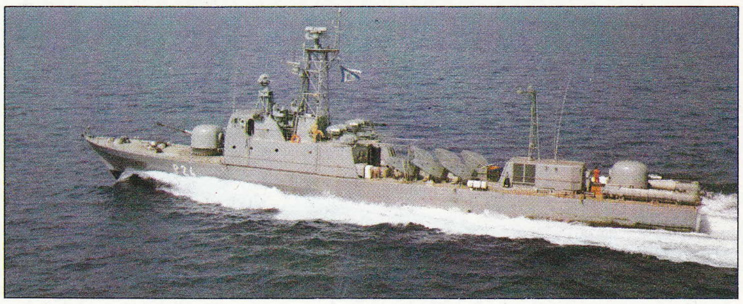


A Type I Greek navy 'Combattante III' class missile boat with four MM38 Exocet container-launchers, two 76-mm (3-in) guns and two torpedo tubes.

ing 14,400 hp (10740 kW) to four shafts
Maximum speed: 36 kts
Complement: 31
Armament: four single Harpoon SSM container-launchers, one 76-mm (3-in) dual-purpose gun and one 40-mm AA gun
Electronics: one WM28 radar fire-control system

Specification

'Combattante III' class (Greek version)
Names: *Antiploiarhos Laskos, Plotarhis Blessas, Ipoploiarhos Mikonios* and *Ipoploiarhos Troupakis* (Type I); *Simeoforos Kavaloudis, Anthipoploiarhos Kostakos, Ipoploiarhos Deyiannis, Simeoforos Xenos, Simeoforos Simitzopoulos* and *Simeoforos Starakis* (Type II)
Displacement: 425 tons full load
Dimensions: length 56.15 m (184.2 ft); beam 8.0 m (26.2 ft); draught 2.5 m (8.2 ft)
Propulsion: (Type I) four MTU diesels delivering 18,000 hp (13425 kW) to four shafts; (Type II) four MTU diesels delivering 15,000 hp (11190 kW) to four shafts
Maximum speed: (Type I) 36.5 kts and (Type II) 32.5 kts
Complement: 42
Armament: (Type I) two single 76-mm (3-in) 76-mm (3-in) dual-purpose guns, two twin 30-mm AA guns, four single MM38 Exocet SSM launcher-containers and two 533-mm (21-in) torpedo tubes; (Type II) two single 76-mm (3-in) dual-purpose guns, two twin 30-mm AA guns and six Penguin Mk 2 SSM launcher-containers
Electronics: (Type I) one Thomson-CSF fire-control system, one Castor radar, one Pollux radar and one Triton radar; (Type II) one Thomson-CSF fire-control system, one Decca TM1226 radar and one D1280 radar



The first of the Type II Greek navy 'Combattante III' class,* Simeoforos Kavaloudis*, equipped with six container-launchers for the cheaper Penguin Mk II surface-to-surface missile system in place of Exocet.

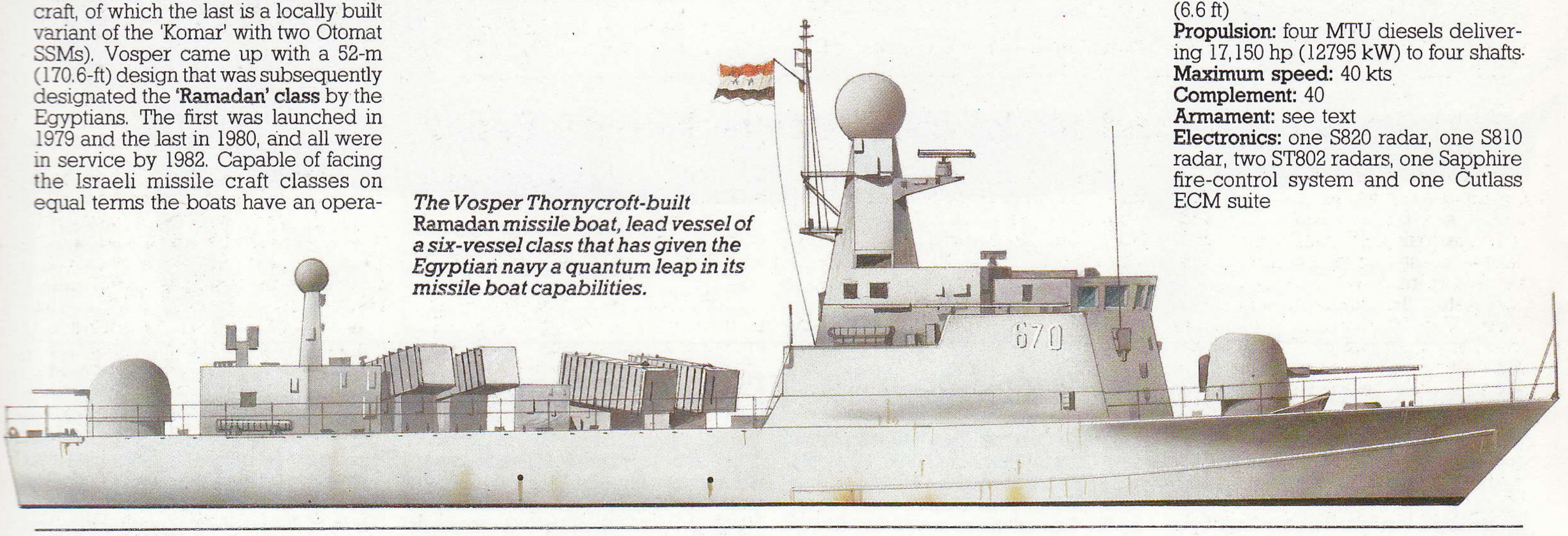
UK

'Ramadan' class fast attack craft (missile)

As a direct result of the break with the Soviet Union in the early 1970s, and to make good the war losses from the 1973 'Yom Kippur' War with Israel, Egypt turned to the British shipbuilders Vosper Thornycroft in 1977 with a £150 million contract to build a six-boat class of missile craft to complement its ageing missile craft force of six 'Osa I', four 'Komar' and six 'October' class craft, of which the last is a locally built variant of the 'Komar' with two Otomat SSMs). Vosper came up with a 52-m (170.6-ft) design that was subsequently designated the **'Ramadan' class** by the Egyptians. The first was launched in 1979 and the last in 1980, and all were in service by 1982. Capable of facing the Israeli missile craft classes on equal terms the boats have an operations room equipped with a Marconi Sapphire fire-control system with two radar and TV gun directors for the weapons aboard. Two alternative optical fire-control directors are also carried. A Decca-Racal Cutlass ECM outfit is also fitted for electronic warfare purposes. The main gun armament comprises a single Italian-built 76-mm (3-in) OTO-Melara dual-purpose gun forward. The gun is effective up to 7000 m (7,655 yards) for anti-aircraft fire and to 15000 m (16,405 yards) in the surface-to-surface role. Ordered by some 20 nations, the gun is used extensively on larger missile and patrol craft. Aft is a twin Breda 40-mm AA mounting, whilst the missile armament comprises four launcher-containers for Otomat Mk I SSMs. To back up the 'Ramadans' the older missile boats are gradually being put through modernization programmes.

Specification

Names: *Ramadan, Khyber, El Kadesseya, El Yarmouk, Hettein* and *Badr*
Displacement: 312 tons full load
Dimensions: length 52.0 m (170.6 ft); beam 7.6 m (25 ft); draught 2.0 m (6.6 ft)
Propulsion: four MTU diesels delivering 17,150 hp (12795 kW) to four shafts
Maximum speed: 40 kts
Complement: 40
Armament: see text
Electronics: one S820 radar, one S810 radar, two ST802 radars, one Sapphire fire-control system and one Cutlass ECM suite



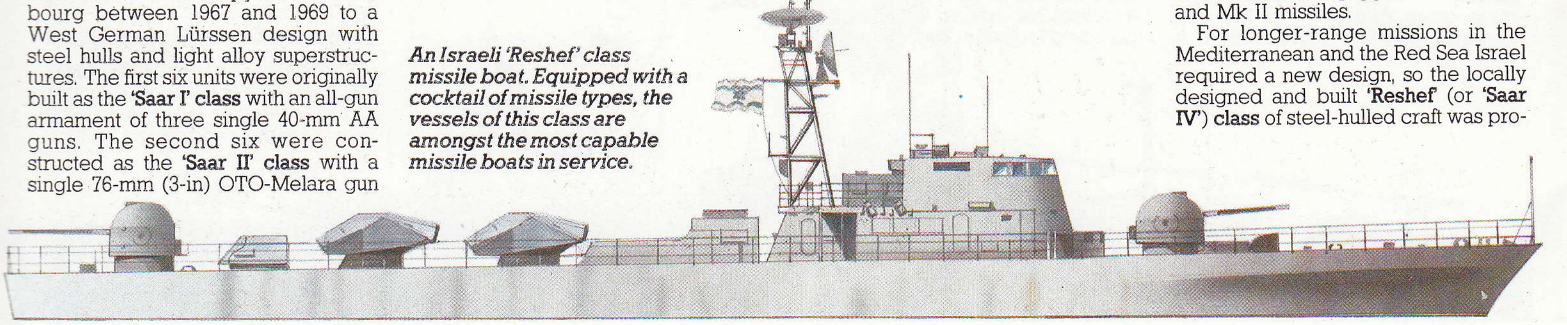
The Vosper Thornycroft-built* Ramadan *missile boat, lead vessel of a six-vessel class that has given the Egyptian navy a quantum leap in its missile boat capabilities.

ISRAEL

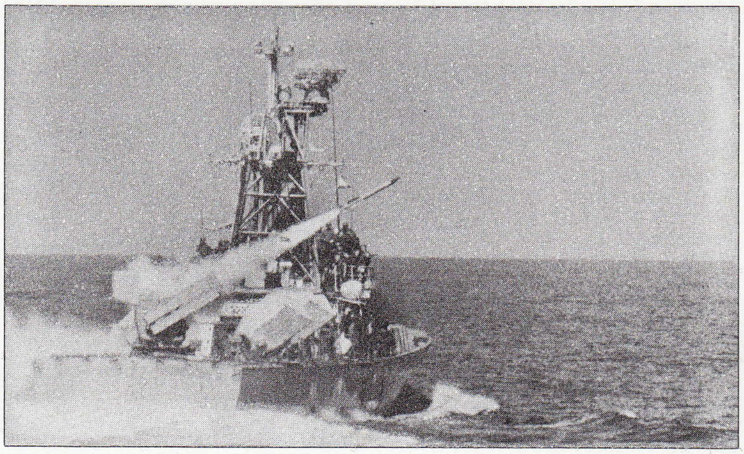
'Saar', 'Reshef' and 'Alia' class fast attack craft (missile)

After the USSR, and hastened in its plans by the loss of the *Eilat* to an Egyptian missile attack in 1967, the Israeli navy was the first of the 'European' powers to realize the importance of the missile craft. The first class that Israel ordered was the **'Saar' class**, built by the French CMN shipyard in Cherbourg between 1967 and 1969 to a West German Lürssen design with steel hulls and light alloy superstructures. The first six units were originally built as the **'Saar I' class** with an all-gun armament of three single 40-mm AA guns. The second six were constructed as the **'Saar II' class** with a single 76-mm (3-in) OTO-Melara gun forward, two single 12.7-mm (0.5-in) heavy machine-guns and two triple mountings for the Gabriel Mk I SSM. Currently all the 'Saars' have been modified to carry new armament. Four of the original 'Saar I' have been modified as ASW units with EDO 780 variable-depth sonar aft and two to four Mk 32 tubes for 324-mm (12.75-in) Mk 46 45-kt, 11-km (6.8-mile) range active/passive acoustic-homing ASW torpedoes. The gun fit is two single 40-mm AA and two single 12.7-mm (0.5-in) heavy machine-guns. The remaining two units have been given the same gun armament plus one triple and two single launchers for Gabriel Mk I and Mk II missiles. They have been redesignated 'Saar II', while the original six 'Saar II' craft have been re-equipped with a pair of Harpoon SSM launchers in place of one of the triple Gabriel mountings and redesignated the **'Saar III' class.** The remaining Gabriel launcher has been equipped to fire Mk I and Mk II missiles.

For longer-range missions in the Mediterranean and the Red Sea Israel required a new design, so the locally designed and built **'Reshef'** (or **'Saar IV'**) class of steel-hulled craft was pro-



An Israeli 'Reshef' class missile boat. Equipped with a cocktail of missile types, the vessels of this class are amongst the most capable missile boats in service.



A 'Reshef' class vessel, used as the testbed for the IAI Barak short-range point-defence missile system. This will take the place of the SA-7 'Grail' and the Redeye shoulder-launched missiles currently used.

duced. The first two of these, *Reshef* and *Keshet*, were involved in the 1973 Arab-Israeli war. These craft have air-conditioned quarters, a combat operations centre, and Italian- and Israeli-built ESM/ECM systems. A total of 10 was constructed (two subsequently being transferrd to Chile), whilst three others were built in Israel for South Africa with another six built at Durban under licence. Currently the Israeli 'Reshefs' carry an armament formed from the following: two or four Harpoon SSMs, four or five Gabriel Mk II or Mk III SSMs, one or two single 76-mm (3-in) dual-purpose guns or one 76-mm (3-in) dual-purpose and one 40-mm AA gun plus, in all craft, two single 20-mm AA cannon and three twin 12.7-mm (0.5-in) heavy machine-guns. An EDO sonar is fitted in some craft.

Following the testing of the 'Reshef' class *Nitzhon* with a temporary helicopter landing pad aft, and to meet a requirement for a missile craft group leader, the **'Alia'** (or **'Saar 4.5'**) **class** was designed and built. Using the successful 'Reshef' class hull as the basis the 'Alias' have a helicopter hangar and landing platform aft for a Bell Model 206 ASW and target-spotting helicopter. The latter is particularly useful for over-the-horizon targetting of the Harpoon SSMs carried on one quadruple or two twin launchers. The other armament is four single Gabriel Mk II and Mk III SSMs, a twin 30-mm AA gun mounting, two single 20-mm AA guns and four single 12.7-mm (0.5-in) machine-guns. Provision is also made on the hangar roof for a Barak short-range air-defence missile system when it comes into service. Further missile boat designs are believed to be under consideration.

Specification

'Saar II and III' classes
Names: *Mivtach, Miznag, Mifgav, Eilath, Haifa* and *Akko* ('Saar II'); *Saar, Soufa, Gaash, Herev, Hanit* and *Hetz* ('Saar III')
Displacement: 250 tons full load
Dimensions: length 45.0 m (147.6 ft); beam 7.0 m (23 ft); draught 2.5 m (8.2 ft)
Propulsion: four Maybach (MTU) diesels delivering 14,000 hp (10440 kW) to four shafts
Maximum speed: 40 kts
Complement: 35-40
Armament: see text
Electronics: one Thomson-CSF Neptune TH-D1040 radar, one Selenia Orion RTN-10X radar, ECM equipment and EDO 780 variable-depth sonar

Specification

'Reshef' class
Names: *Reshef, Kidon, Tarshish, Yaffo, Nitzhon, Komemuit, Atsmout* and *Moledet*
Displacement: 450 tons full load
Dimensions: length 58.1 m (190.6 ft); beam 7.6 m (24.9 ft); draught 2.4 m (8 ft)
Propulsion: four Maybach (MTU) diesels delivering 14,000 hp (10440 kW) to four shafts
Maximum speed: 32 kts
Complement: 45
Armament: see text
Electronics: one Thomson-CSF Neptune TH-D1040 radar, one Selenia Orion RTN-10X radar, one Elta MN-53 ECM system, chaff launchers and (in some craft) ELAC sonar

Specification

'Alia' class
Names: *Alia, Geoula, Romat, Keshet* and two more
Displacement: 500 tons full load
Dimensions: length 61.7 m (202.4 ft); beam 7.6 m (24.9 ft); draught 2.4 m (7.9 ft)
Propulsion: four Maybach (MTU) diesels delivering 14,000 hp (10440 kW) to four shafts
Maximum speed: 31 kts
Complement: 53
Armament: see text
Electronics: as on the 'Reshef' class craft

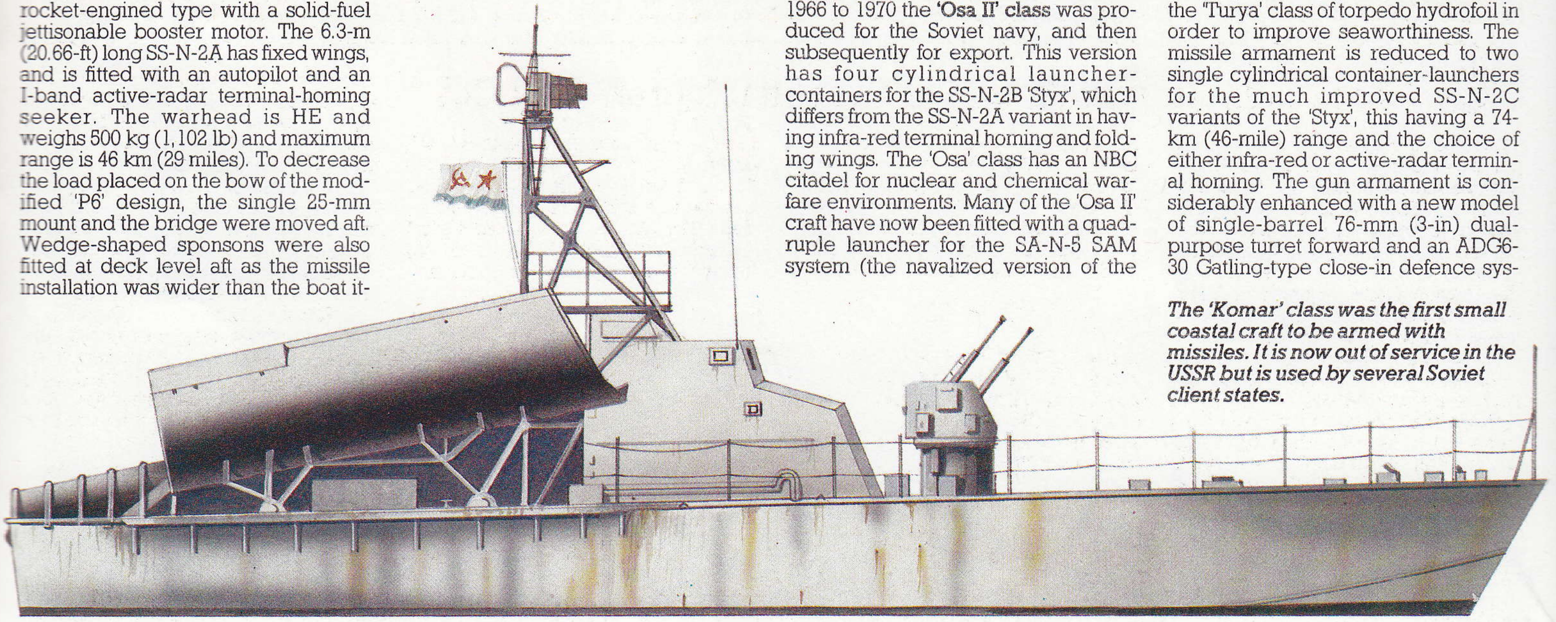
USSR

'Komar', 'Osa' and 'Matka' class fast attack craft (missile)

The **'Komar' class** of missile craft (Soviet designation RKA, or *raketnyy kater*) was built between 1959 and 1961. Heralding an entirely new concept in coastal forces, the first of the Komars were converted from newly completed 'P6' motor torpedo boat hulls. About 100 were built of the wooden-hulled design. The 'Komar' carries one fixed forward-firing open-ended missile-launcher bin aimed at about 1.5° outboard and elevated at about 12°, on each side of the deck aft. The missiles carried are the specially designed SS-N-2A 'Styx', a liquid-fuel rocket-engined type with a solid-fuel jettisonable booster motor. The 6.3-m (20.66-ft) long SS-N-2A has fixed wings, and is fitted with an autopilot and an I-band active-radar terminal-homing seeker. The warhead is HE and weighs 500 kg (1,102 lb) and maximum range is 46 km (29 miles). To decrease the load placed on the bow of the modified 'P6' design, the single 25-mm mount and the bridge were moved aft. Wedge-shaped sponsons were also fitted at deck level aft as the missile installation was wider than the boat itself. Struts were fitted to protect the launchers from spray. No 'Komars' remain in service with the Soviet navy, but several still serve in other navies. The Chinese still build a steel-hulled variant, the **'Hegu' class** with two 25-mm AA mountings. The 'Komar' was the world's first missile boat to be used in action when in October 1967 two Egyptian boats sank the Israeli destroyer *Eilat*. In April 1972 a North Vietnamese 'Komar' launched a 'Styx' SSM at three American warships bombarding coastal targets in North Vietnam. The USS *Sterett*, a guided-missile cruiser, engaged the missile with a Terrier SAM and shot it down, this being the first time an anti-ship missile was destroyed by another missile in combat.

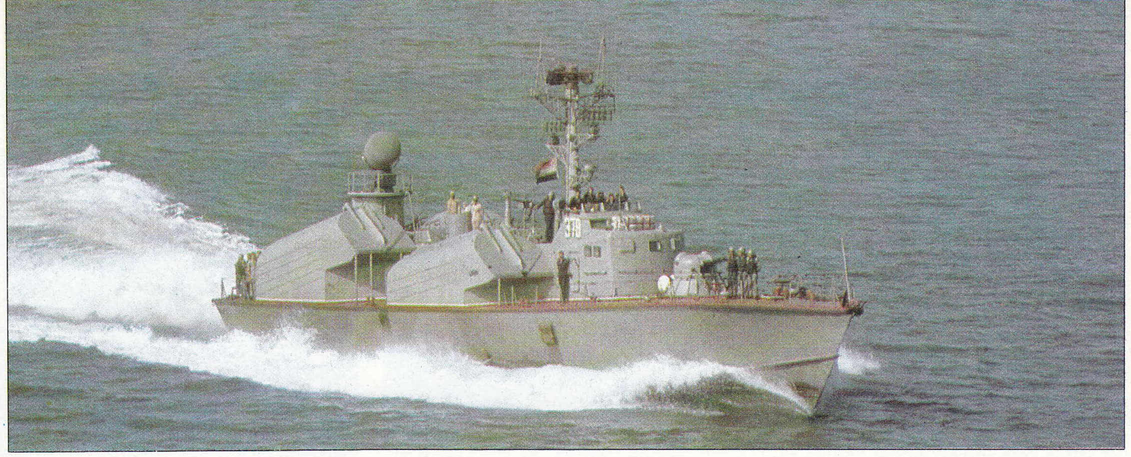
From 1961 onwards to 1966 the replacement for the 'Komars' was built, this being the steel-hulled **'Osa I' class.** The design carried four completely enclosed launcher bins for the SS-N-2A, two on each side of the superstructure and arranged so that the aft launchers, elevated to 15°, fire over the forward pair, elevated to 12°. From 1966 to 1970 the **'Osa II' class** was produced for the Soviet navy, and then subsequently for export. This version has four cylindrical launcher-containers for the SS-N-2B 'Styx', which differs from the SS-N-2A variant in having infra-red terminal homing and folding wings. The 'Osa' class has an NBC citadel for nuclear and chemical warfare environments. Many of the 'Osa II' craft have now been fitted with a quadruple launcher for the SA-N-5 SAM system (the navalized version of the SA-7 'Grail' man-portable infra-red homing missile). Currently there are some 120 'Osa I' and 'Osa II' class craft in service with the four Soviet fleets. 'Osa I' has seen combat service with four navies: those of Egypt (1973), India (1971), Iraq (current Gulf War) and Syria (1973). The 'Osa II' has seen combat with Iraq. The type has been exported widely, and the Chinese also produce their own variant.

In 1978 the first of the 'Osa' replacement class was seen. This is the **'Matka' class**, which utilizes the 'Osa' hull but has a hydrofoil system similar to that of the 'Turya' class of torpedo hydrofoil in order to improve seaworthiness. The missile armament is reduced to two single cylindrical container-launchers for the much improved SS-N-2C variants of the 'Styx', this having a 74-km (46-mile) range and the choice of either infra-red or active-radar terminal homing. The gun armament is considerably enhanced with a new model of single-barrel 76-mm (3-in) dual-purpose turret forward and an ADG6-30 Gatling-type close-in defence sys-



The 'Komar' class was the first small coastal craft to be armed with missiles. It is now out of service in the USSR but is used by several Soviet client states.

tem aft. Current building rate of the 'Matka' class is three per year.



An Egyptian 'Osa I' missile boat. Most Egyptian Soviet-built missile boats have undergone refits with Western electronic equipment in place of the Soviet systems. They also carry SA-N-5 SAMs.

Specification
'Komar' class

Operators: Algeria (6), China (2 plus 96 of locally-built variants), Cuba (10), Egypt (4 plus 6 of a locally-built variant), North Korea (6 plus 4 of a locally-built variant) and Vietnam (3).

Displacement: 80 tons full load

Dimensions: length 26.8 m (87.9 ft); beam 6.4 m (21 ft); draught 1.8 m (5.9 ft)

Propulsion: four diesels delivering 4,800 hp (3580 kW) to four shafts

Maximum speed: 40 kts

Complement: 11

Armament: two SS-N-2A 'Styx' SSM launchers and one twin 25-mm AA gun

Electronics: one 'Square Tie' search radar, one 'high Pole-A' IFF and one 'Dead Duck' IFF

Specification
'Osa I' class

Operators: Algeria (3), Bulgaria (3), China (115), Cuba (5), East Germany (15), Egypt (8), India (6), Iraq (4), Libya (12), North Korea (8), Poland (14), Romania (5), Syria (6), USSR (70), Yugoslavia (10)

Displacement: 210 tons full load

Dimensions: length 39.0 m (128 ft); beam 7.7 m (25.3 ft); draught 1.8 m (5.9 ft)

Propulsion: three diesels delivering 12,000 hp (8950 kW) to three shafts

Maximum speed: 38 kts

Complement: 30

Armament: four SS-N-2A 'Styx' SSM launchers and two twin 30-mm AA guns

Electronics: one 'Square Tie' search radar, one 'High Pole-B' IFF, one 'Drum Tilt' fire-control radar and two 'Square Head' IFF interrogators

Specification
'Osa II' class

Operators; Algeria (9), Angola (4), Bulgaria (2), Cuba (13), Ethiopia (4), Finland (4), India (8), Iraq (8), Libya (12), Somalia (2), South Yemen (6), Syria (8), USSR (50), North Yemen (2), South Yemen (7) and Vietnam (8)

Displacement: 245 tons full load

Dimensions: 39.0 m (128 ft); beam 7.7 m (25.3 ft); draught 1.9 m (6.2 ft)

Propulsion: three diesels delivering 15,000 hp (11190 kW) to three shafts

Maximum speed: 40 kts

Complement: 30

Armament: four SS-N-2B 'Styx' SSM launchers, one quadruple SA-N-5 SAM launchers and two twin 30-mm AA guns

Electronics: as on 'Osa I' class

Specification
'Matka' class

Operator: USSR (17+)

Displacement: 260 tons full load

Dimensions: length 40.0 m (131.2 ft); beam 7.7 m (25.3 ft) for the hull and 12.0 m (39.4 ft) for the foil; hull draught 1.9 m (6.2 ft)

Propulsion: three diesels delivering 15,000 hp (11190 kW) to three shafts

Maximum speed: 42 kts

Complement: 30

Armament: two SS-N-2C 'Styx' SSM launchers, one 76-mm (3-in) dual-purpose gun and one ADG6-30 AA 'Gatling' gun

Electronics: one 'Cheese Cake' search radar, one 'Bass Tilt' fire-control radar, one 'High Pole-B' IFF and one 'Square Head' IFF interrogator

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USSR

'P4', 'P6', 'Shershen', 'Mol' and 'Turya' class fast attack craft (torpedo)

The **'P4' class** was the second Soviet post-war torpedo boat class. Built with aluminium hulls from around 1952 to 1958, their small size restricted employment to inshore waters. Armed with two 457-mm (18-in) anti-ship torpedo tubes, a twin heavy machine-gun mounting and between four and eight depth charges, the 'P4' has long been struck from Soviet navy service, although it still can be found with other navies.

The successor to the 'P4' was the wooden-hull **'P6' class,** built from 1953 to 1960. This was the standard Soviet torpedo attack craft until the mid-1970s, over 500 hulls being constructed. The basic hulls were also converted to other types, such as the 'Komar' (about 100), the 'MO-VI' patrol craft (50), the 'P8' and 'P10' experimental torpedo attack craft (20) and as target and KGB border surveillance patrol craft. Large numbers were exported, whilst the last versions in Soviet service have now been retired.

The largest conventional torpedo attack craft built was the **'Shershen' class** from 1962 to 1974. This design was based on a smaller version of the 'Osa I' hull with the same powerplant and four 533-mm (21-in) tubes for long-range anti-ship torpedoes instead of missiles. Fitted with an NBC citadel, the class is intended to work with the 'Osa' missile boats in mixed brigades of coastal craft. The **'Mol' class** is a modified version for export and based on the standard 'Osa' hull. These carry shorter-range torpedoes than those carried on Soviet navy torpedo craft. The Soviets have built some 85 'Shershens' and seven 'Mols', but have only some 30 'Shershens' in service at present. These are slowly being phased out.

In 1971 the 'Shershen' was joined in production by the **'Turya' class** torpedo-armed fast attack hydrofoil. This has the 'Osa II' hull and machinery with a single foil system forward. The class is usually stated to be for anti-ship attacks, but the four 533-mm (21-in) torpedo tubes fitted actually carry acoustic-homing anti-submarine torpedoes. The vessels act as fast-reaction ASW units and work in conjunction with shore-based ASW helicopters and aircraft (and other small ASW surface units) for coastal defence. For these operations they carry a dipping sonar (of the type seen on the Kamov Ka-25 'Hormone-A' ASW helicopter) fitted to their transom. The sonar is particularly useful in the Baltic and Pacific areas for searching below thermal layers. Production for the Soviet navy stopped in 1979 after some 30 units had been produced, although a further six have subsequently been built for Cuba without the sonar and fitted with 533-mm (21-in) anti-ship torpedoes.

Specification
'P4' class

Operators: Albania (12), Benin (2), Bulgaria (4), China (60), Cuba (12), Egypt (4), North Korea (12), North Yemen (4), Syria (8), Tanzania (4), Vietnam (3) and Zaire (3).

Displacement: 25 tons full load

Dimensions: length 22.0 m (72.2 ft); beam 4.7 m (15.4 ft); draught 1.5 m (4.9 ft)

Propulsion: two diesels delivering 2,400 hp (1790 kW) to two shafts

Maximum speed: 42 kts

Complement: 12

Armament: two 457-mm (18-in) anti-ship torpedo tubes, one twin 12.7- or 14.5-mm (0.5- or 0.57-in) heavy machine-gun and between four and eight depth charges

Electronics: one 'Skin Head' search radar, one 'High Pole-A' IFF and one 'Dead Duck' IFF

Specification
'P6' class

Operators: Algeria (4), China (65), Cuba (6), Egypt (20), Equatorial Guinea (1), Guinea (4), Guinea-Bissau (1), Iraq (12), North Korea (64 plus 8 of a locally-built variant), Somalia (4), South Yemen (2), Tanzania (3) and Vietnam (3)

Displacement: 73 tons full load

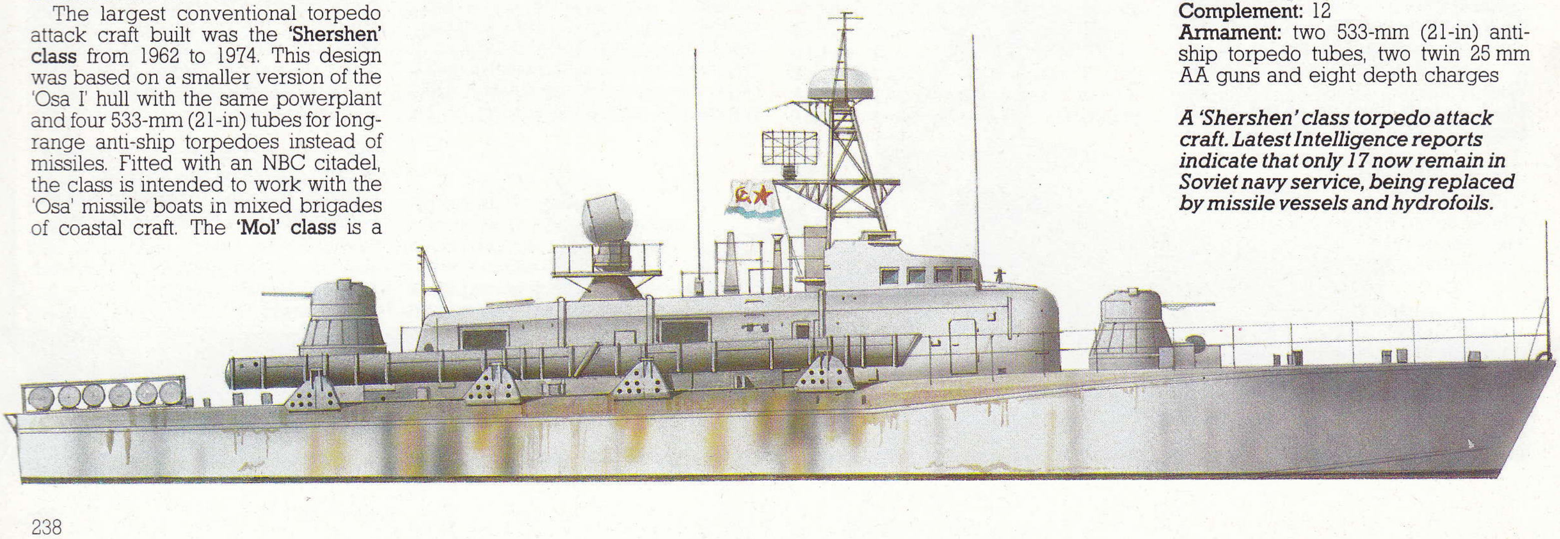
Dimensions: length 26.0 m (85.3 ft); beam 6.0 m (19.7 ft); draught 1.5 m (4.9 ft)

Propulsion: four diesels delivering 5,800 hp (4325 kW) to four shafts

Maximum speed: 43 kts

Complement: 12

Armament: two 533-mm (21-in) anti-ship torpedo tubes, two twin 25 mm AA guns and eight depth charges



A 'Shershen' class torpedo attack craft. Latest Intelligence reports indicate that only 17 now remain in Soviet navy service, being replaced by missile vessels and hydrofoils.

Soviet Missile and Torpedo Boat Tactics

The Soviet navy concentrated much of its immediate post-war effort on torpedo boat development and tactics. The addition of the newly-developed surface-to-surface missile was a natural progression, and the missile boat emerged to take its place in the Soviet navy of today.

Below: A 'Nanuchka I' class missile corvette, designated Maly raketny korabl' (small missile ship) by the Soviets. It can act as a command and control ship for smaller missile boats.

The Soviets concentrate their training on nocturnal attacks by several missile and torpedo craft squadrons against important convoys, amphibious forces in transit, or high-value warships in coastal waters. For daytime attacks large numbers of fighter-bombers are provided to aid the craft.

The largest unit in the coastal forces is a brigade, which normally consists of three or four squadrons of missile and/or torpedo craft. Each squadron has six craft divided into groups of two, which stay together even when the craft undergo a refit. A typical attack would consist of a missile craft squadron and two torpedo boat squadrons with the attack mounted in five phases. The first phase is the covert approach, which starts from the moment the boats leave their base and finishes when the target is located and identified. Once this has been achieved then the second phase, the tactical deployment, begins and the craft (in divisional squadron column formation) head towards the best attack positions that avoid mutual interference. At these points the squadrons adopt either a left or right vee formation or a line abreast formation for the third phase, the run-in to the target. The fourth phase is the actual attack, and lasts only 10-15 seconds for each group as it fires its weapons. For the torpedo craft this is at some 5000-m (5,470-yard) range, when a pair of straight running or passive acoustic homing torpedoes is launched; for the missile boats, the missiles are usually launched at between 17600 and 20800 m (19,250 and 22,750 yards) in pairs, the number fired depending on the target type. Typically the number is seven or eight for a cruiser or above, four for a destroyer, one or two for a small transport or landing craft, and between two and four for a fast attack missile or torpedo craft and small escorts. The fifth and final phase is the group's rapid disengagement from the battle zone. For the first, second and final phases the attacking craft use their highest continuous speed whilst for the third and fourth phases they use maximum speed. The missile craft are usually assigned the task of engaging any warships present even in the midst of a convoy, whilst the torpedo craft are used primarily to attack the merchant ships and any damaged warships that may result from the missile attack. The attacks by both types of craft are co-ordinated by the unit commander, who normally travels in one of the missile boat groups.

Although the use of the torpedo craft is declining in the Soviet navy, it is probable that new dispositions will be worked out for the brigades, using only missile boats in the squadrons. Possible combinations are a squadron of the very large 'Nanuchka' class missile craft (sometimes termed missile corvettes) with two or three squadrons of 'Tarantul', 'Matka' or 'Osa' class craft, or a squadron of 'Tarantul' class craft with two or three 'Osa' or 'Matka' class squadrons. Both variations provide grave problems to defending forces due to the diversity of the missile types carried and the craft involved. However, non-Soviet Warsaw Pact navies still build and use torpedo craft in some numbers, so the tactics devised by the Soviets for such mixed forces of missile- and torpedo-armed craft will still be around for many years to come. Whatever the composition, the Warsaw Pact coastal forces provide a real threat to NATO and its coastal lines of communication, and this is a threat that must not be underestimated. The Falklands War gave a salutary lesson to those who ignored close-range air defence of warships against aircraft.

Below: 'Osa' class missile craft provide the backbone of Soviet coastal forces. Operating up to brigade (24 vessels) strength, Osas can launch attacks from over 17 km (10.5 miles).

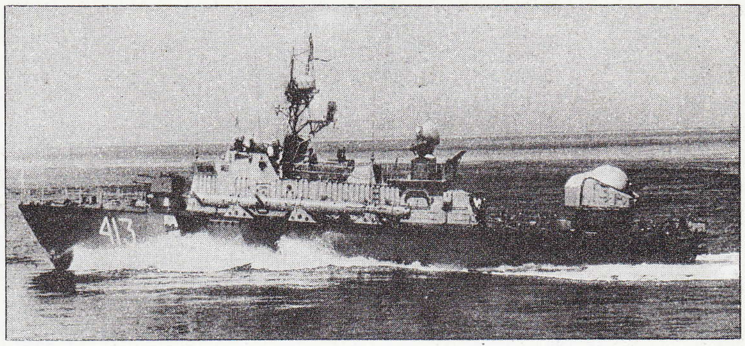
'P4', 'P6', 'Shershen', 'Mol' and 'Turya' class (continued)

Electronics: one 'Pot Head' search radar, one 'High Pole-A' IFF and one 'Dead Duck' IFF

Specification
'Shershen' class
Operators: Angola (4), Bulgaria (6), Cape Verde (2 without torpedo tubes), Congo (3 without torpedo tubes), East Germany (18), Egypt (6), Guinea (1), Guinea-Bissau (2 without torpedo tubes), North Korea (4), USSR (17), Vietnam (12) and Yugoslavia (4 plus 10 locally built)
Displacement: 180 tons full load
Dimensions: length 34.0 m (111.5 ft); beam 7.2 m (23.6 ft); draught 1.5 m (4.9 ft)
Propulsion: three diesels delivering 12,000 hp (8950 kW) to three shafts
Maximum speed: 47 kts
Complement: 23
Armament: four 533-mm (21-in) anti-ship torpedo tubes, two twin 30 mm AA guns and 12 depth charges
Electronics: one 'Pot Drum' search radar, one 'Drum Tilt' fire-control radar, one 'High Pole-A' IFF and two 'Square Head' IFF interrogators

Specification
'Mol' class
Operators: Ethiopia (2), Somalia (4 without torpedo tubes) and Sri Lanka (1 without torpedo tubes)
Displacement: 220 tons full load
Dimensions: length 39.0 m (128 ft); beam 7.7 m (25.3 ft); draught 1.7 m (5.6 ft)
Propulsion: three diesels delivering 15,000 hp (11190 kW) to three shafts
Maximum speed: 36 kts
Complement: 25
Armament: four 533-mm (21-in) anti-ship torpedo tubes and two twin 30-mm AA guns
Electronics: one 'Pot Head' search radar, one 'Drum Tilt' fire-control radar, one 'High Pole-B' IFF and one 'Square Head' IFF interrogator

Specification
'Turya' class
Operators: Cuba (8) and USSR (30)
Displacement: 240 tons full load
Dimensions: length 39.0 m (128 ft); beam 7.2 m (23.6 ft) over the hull and 12.0 m (39.4 ft) over the foil; draught 1.8 m (5.9 ft) without the foil
Propulsion: three diesels delivering 15,000 hp (11190 kW) to three shafts
Maximum speed: 42 kts
Complement: 30
Armament: four 533-mm (21-in) anti-submarine torpedo tubes, one twin 57-mm AA gun and one twin 25-mm AA gun



The 'Turya' class hydrofoil, of which Cuba received eight by mid-1983. The 30 vessels in Soviet service have been given the designation* torpedny kater *(torpedo cutter).

Electronics: one 'Pot Head' search radar, one 'Muff Cob' fire-control radar, one 'High Pole-A' IFF, one 'Square Head' IFF interrogator and one helicopter-type dipping sonar

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USSR

'Stenka', 'Zhuk' and 'Shmel' class patrol craft

Designated as a border patrol ship (PSKR, or *pogranichnyy storozhevoy korabl'*) by the Soviets, the **'Stenka' class** currently comprises the second largest coastal-force class in service, with some 90 vessels. These are primarily operated by the Maritime Border Guard Directorate of the KGB and were built from 1967 to 1977. The design utilizes the 'Osa' hull with the same machinery outfit as the 'Osa I' but a modified superstructure and bridge that reflect the operational role. Although used for maritime patrol, the craft have a useful ASW outfit with four single torpedo tubes for the 400-mm (15.75-in) electric-powered acoustic-homing ASW torpedo and two depth-charge racks for a total of 12 charges. A dipping sonar of the type carried on the 'Turya' class of hydrofoil is also carried. Several of the boats have had the torpedo tubes removed to make space for a motor launch, presumably for close inshore patrol where the mother ship cannot go.

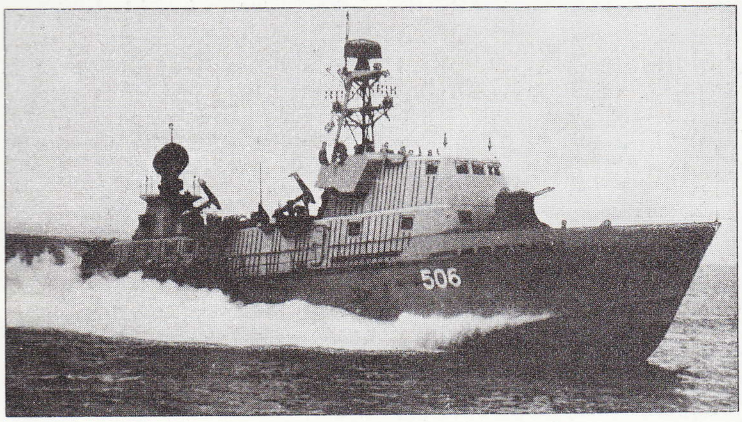
To support the 'Stenkas' in their KGB role the Soviets began to build a small coastal patrol boat from 1970 onwards. Known as the **'Zhuk' class** the design is still in production primarily for export. Some 30 or more are in service with the KGB and Soviet navy, whilst over 65 have been built for transfer to 15 other countries.

The Soviets also have a great tradition in riverine and inland waterway warfare. During World War II they developed a series of improvised armoured craft for use on the Danube, Volga, Amur and Ussuri river complexes and the many large lakes found in the Soviet Union. They continued this practice with post-war designs, of which the most recent, built between 1967 and 1974, is the **'Shmel' class.** The most distinctive feature of the 85-vessel class is the forward 76-mm (3-in) gun turret, which is similar to that of the PT-76 light amphibious tank with its co-axial 7.62-mm (0.3-in) machine-gun. Behind the turret is an armoured bridge and enclosed space fitted with bulkheads, a heavy machine-gun position and several firing slits for small arms and LMGs. A twin 25-mm AA mounting with light protection is on the after deck. On a number of boats between this and the battle position are mounted one or two 17-tube BM-14 140-mm (5.5-in) multiple rocket-launcher systems for shore bombardment. It is estimated that for short-distance raiding missions, a platoon of Naval Infantry or army special forces could be carried on three 'Shmels'.

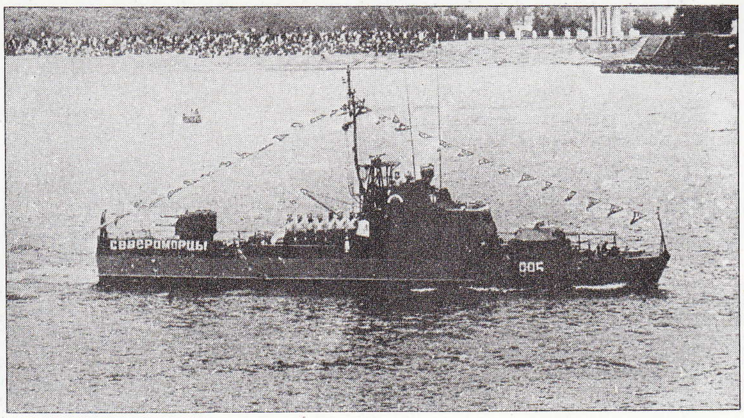
Specification
'Stenka' class
Operators: USSR (90)
Displacement: 210 tons full load
Dimensions: length 39.5 m (129.6 ft); beam 7.7 m (25.3 ft); draught 1.8 m (5.9 ft)
Propulsion: three diesels delivering 12,000 hp (8950 kW) to three shafts
Maximum speed: 36 kts
Complement: 22
Armament: four 400-mm (15.75-in) anti-submarine torpedo tubes, two twin 30-mm AA guns and 12 depth charges on two racks
Electronics: one 'Pot Drum' search radar, one 'Drum Tilt' fire-control radar, one 'High Pole-B' IFF, two 'Square Head' IFF interrogators and one helicopter-type dipping sonar

Specification
'Zhuk' class
Operators: Algeria (1), Angola (1), Benin (4), Bulgaria (5), Cape Verde (1), Cuba (22), Ethiopia (2), Equatorial Guinea (3), Iraq (5), Mozambique (5), North Yemen (4), Seychelles (2), Somalia (3), South Yemen (2), North Yemen (4), Syria (3), USSR (30+) and Vietnam (6)
Displacement: 50 tons full load
Dimensions: length 22.9m (75.1 ft); beam 4.9 m (16.1 ft); draught 1.5 m (4.9 ft)
Propulsion: two diesels delivering 2,400 hp (1790 kW) to two shafts
Maximum speed: 30 kts
Complement: 17
Armament: one or two twin 14.5-mm (0.57-in) heavy machine-guns
Electronics: one 'Spin Trough' search radar

Specification
'Shmel' class
Operator: USSR (85)
Displacement: 60 tons full load
Dimensions: length 28.3m (92.8 ft); beam 4.6 m (15.1 ft); draught 1.0 m (3.3 ft)
Propulsion: two diesels delivering 2,400 hp (1790 kW) to two shafts
Maximum speed: 22 kts
Armament: one 76-mm (3-in) gun in light tank turret, one twin 25-mm AA gun, one or two 17-tube 140-mm (5.5-in) rocket-launchers, plus provision for heavy and medium machine-guns, and for mines
Electronics: none



The 'Stenka' class of patrol craft is almost exclusively operated by the Maritime Border Guard Directorate of the KGB to help prevent 'escapes' from the USSR.



A 'Schmel' class riverine warfare craft seen on the River Danube at Vienna. The Soviet navy uses many such craft on its inland waterways and is building more.

Royal Air Force Strike Command

SEPECAT Jaguars provide tactical strike and close support for RAF Strike Command, with three squadrons all based at Coltishall.

One of the three major components forming today's Royal Air Force, Strike Command is, as its name implies, the controlling element of the UK's home-based air power. Mirrored in some respects by RAF Germany, and provided with personnel and equipment by Support Command, it undertakes a broad range of offensive and defensive tasks, omitting only the strategic nuclear deterrent role assigned to the Royal Navy's Polaris submarines in 1969.

Proudly perpetuating the traditions of the Battle of Britain fighter squadrons, the bomber units which wrought devastation upon enemy industry and cities, and maritime patrol forces responsible for sweeping U-boats from the seas, the command comprises three groups, each maintaining a role broadly similar to those described. With the passage of time since World War II, however, new responsibilities have been added, whilst a steady contraction in the RAF's size has led to amalgamation and disbandment of some formations.

Nevertheless, Strike Command is currently in the throes of a re-equipment and upgrading programme no less dynamic than that seen during the frantic expansion of the late 1930s, and though it is to emerge only marginally larger than before, capabilities will be greatly enhanced.

Part of this is the result of plans dating back many years, such as introduction of the Panavia Tornado to strike and interceptor squadrons and augmentation of the tanker fleet, but other developments stem from the Falklands war and the added impetus which this conflict gave to a wide range of operational improvements previously awaiting funding. In this connection, high priority has been given to active and passive self-defence for strike aircraft and early introduction of new or modified weaponry, whilst rapid deployment capability will receive a boost from recent purchase of wide-bodied tanker-transports.

Attack forces

Withdrawal of the majestic Avro Vulcan from theatre-nuclear roles in 1982 was responsible for a further round of group mergers in Strike Command, with the effect that from November 1983 strike, close support, inflight-refuelling, tactical reconnaissance and transport duties have been combined in No. 1 Group, with its headquarters at Upavon.

The spearhead of this force is the Panavia Tornado GR.Mk 1, No. 1 Group having attained its planned Tornado establishment of three operational squadrons, a weapons training unit and a conversion unit (the last-mentioned also training students from West Germany and Italy) in 1983. Most of the remaining Tornado squadrons will form in Germany, to be joined by one of the UK-based units; in 1986, No. 1 Group will receive a tactical reconnaissance version of the aircraft with which to equip a further squadron.

With its all-weather penetration capability and armed with conventional or nuclear weapons, the Tornado is a vital element of Strike Command's offensive forces, although it is supported in the tactical strike and close support role by the SEPECAT Jaguar and remarkable BAe Harrier. A product of Anglo-French collaboration, the Jaguar carries cluster bombs (CBUs), 1,000-lb (454-kg) free-fall or retarded bombs or a reconnaissance pod, whilst the STOVL (short take-off, vertical landing) Harrier has a similar armoury, plus a SNEB rocket pod. It has a single oblique camera for reconnaissance duties and can also carry a reconnaissance pod.

Both aircraft are now receiving new equipment to enhance their capabilities in the low-level close-support role, the Jaguar adding a new and more accurate inertial navigation and weapon-aiming system, electronic jamming pods and chaff/flare dispensers; and the Harrier receiving self-defence Sidewinder AAMs and Marconi Zeus integrated radar warning and jamming apparatus.

Rapid deployment

Jaguar and Harrier units are prepared for rapid deployment to Europe in an emergency, their groundcrews, equipment and much else besides travelling inside the aircraft of No. 1 Group's tactical transport force. The brunt of this fetching and carrying is allocated to that airborne workhorse, the Lockheed Hercules, augmented by a squadron of BAe VC10 C.Mk 1s and two BAe 146 C.Mk 1s delivered in 1983 for evaluation as potential replacements for the BAe Andovers of The Queen's Flight.

At a time of crisis, fixed-wing transports would deliver equipment and supplies for the Army and RAF to rear areas, where helicopters are then responsible for transfers to the front line. A major improvement in capacity has come with recent introduction of the Boeing Vertol Chinook twin-rotor helicopter (capable of lifting a 10-ton load), the lighter Aérospatiale Puma nonetheless remaining a valuable transporter of smaller cargoes.

The Falklands war proved beyond doubt the vital importance of inflight-refuelling to all categories of operational aircraft, and was directly responsible for the purchase of six Lockheed TriStar 500s which are currently being converted to TriStar C(K).Mk 1 standard. Far more adaptable than the Victor K.Mk 2 fleet, in that they can carry cargo and passengers as well as fuel, the TriStars will be partnered by nine VC10 K.Mk 2s and VC10 K.Mk 3s (five and four respectively), the first of which was delivered in 1983, although a further 11 Super VC10s are held in storage for possible K.Mk 3 conversion as Victor replacements.

Six Vulcan B.Mk 2s, hastily converted to Vulcan K.Mk 2s, entered service just too late to participate in the Falklands hostilities, and are being withdrawn as the first VC10s arrive. A similar number of Hercules C(K).Mk 1s assist in maintaining the Falklands air bridge.

To be continued

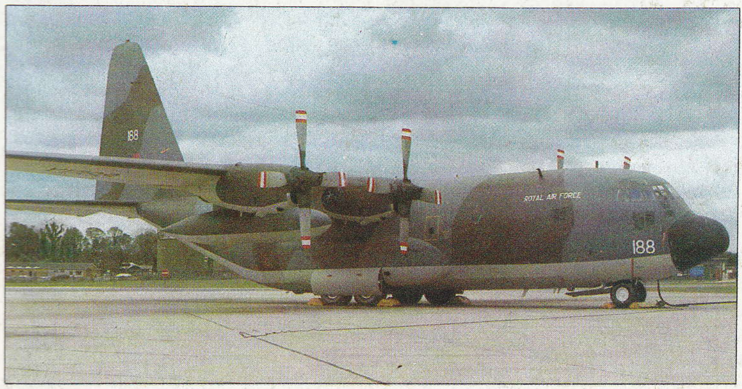
The Pumas of No. 33 Sqn perform light transport duties. They can deploy rapidly around the world, as here to Belize.

RAF STRIKE COMMAND ORDER OF BATTLE
Strike Command HQ: High Wycombe, Bucks

No. 1 Group (HQ: Upavon, Wiltshire)

Squadron	*Equipment*	*Base*	*Role*
No. 1	Harrier GR.Mk 3	Wittering	close support and tactical recce
No. 6	Jaguar GR.Mk 1	Coltishall	tactical strike and close support
No. 7	Chinook HC.Mk 1	Odiham	tactical transport
No. 9	Tornado GR.Mk 1	Honington	interdictor-strike
No. 10	VC10 C.Mk 1	Brize Norton	strategic transport
No. 24	Hercules C.Mk 1/C.Mk 3	Lyneham	transport
No. 27	Tornado GR.Mk 1	Marham	interdictor-strike
No. 30	Hercules C.Mk 1/C.Mk 3	Lyneham	transport
No. 32	Andover C.Mk 1/CC.Mk 2 BAe 125 CC.Mk 3 Gazelle HCC.Mk 4	Northolt	communications
No. 33	Puma HC.Mk 1	Odiham	tactical transport
No. 41	Jaguar GR.Mk 1	Coltishall	tactical recce and close support
No. 47	Hercules C.Mk 1/C.Mk 3	Lyneham	transport
No. 50	Vulcan K.Mk 2	Waddington	airborne refuelling (disbanding)
No. 51	Nimrod R.Mk 1	Wyton	Intelligence-gathering
No. 54	Jaguar GR.Mk 1	Coltishall	tactical strike and close support
No. 55	Victor K.Mk 2	Marham	airborne refuelling
No. 57	Victor K.Mk 2	Marham	airborne refuelling
No. 70	Hercules C.Mk 1/C.Mk 3	Lyneham	transport
No. 72	Wessex HC.Mk 2	Aldergrove	tactical support
No. 115	Andover E.Mk 3	Benson	navaids calibration
No. 207	Devon C.Mk 2	Northolt	communications
No. 617	Tornado GR.Mk 1	Marham	interdictor-strike
No. 226 OCU	Jaguar GR.Mk 1/T.Mk 2	Lossiemouth	pilot conversion
No. 232 OCU	Victor K.Mk 2	Marham	crew conversion
No. 233 OCU	Harrier GR.Mk 3/T.Mk 4	Wittering	pilot conversion
No. 240 OCU	Chinook HC.Mk 1 Puma HC.Mk 1	Odiham	crew conversion
No. 241 OCU	VC10 C.Mk 1/K.Mk 2 BAe 146 C.Mk 1	Brize Norton	crew conversion
No. 242 OCU	Hercules C.Mk 1/C.Mk 3	Lyneham	crew conversion
TTTE	Tornado	Cottesmore	crew conversion
TWCU	Tornado GR.Mk 1	Honington	weapons training
TQF	Andover CC.Mk 2 Wessex HCC.Mk 4	Benson	The Queen's Flight
ATF (in process of formation)	Andover C.Mk 1	Benson	crew conversion
No. 101	VC10 K.Mk 2/K.Mk 3	Brize Norton	airborne refuelling
No. 214	TriStar C(K).Mk 1	Brize Norton	tanker-transport

To be continued



Strike Command relies on the Lockheed C-130 Hercules for most of its heavy transport, which with flight refuelling equipment plays an important part in the supply of the Falklands.